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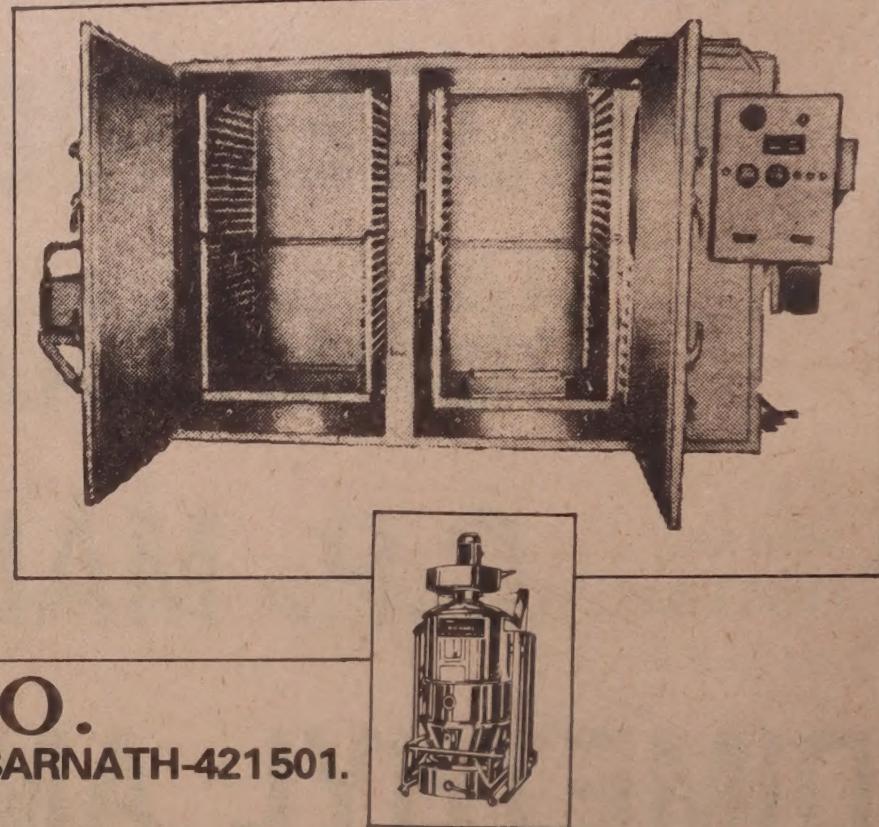
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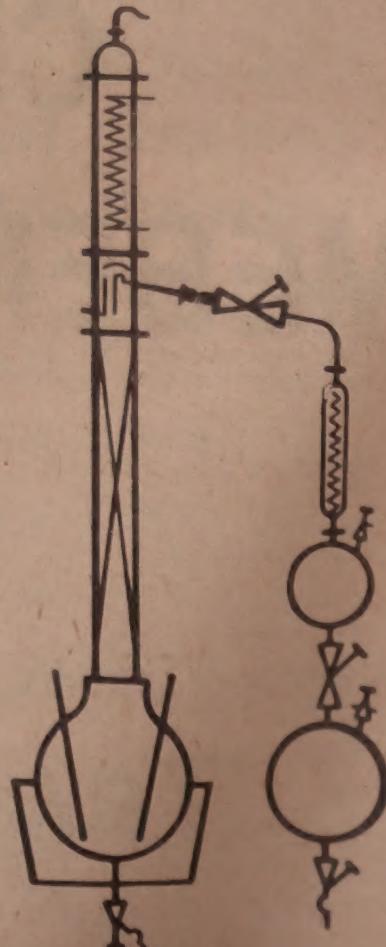
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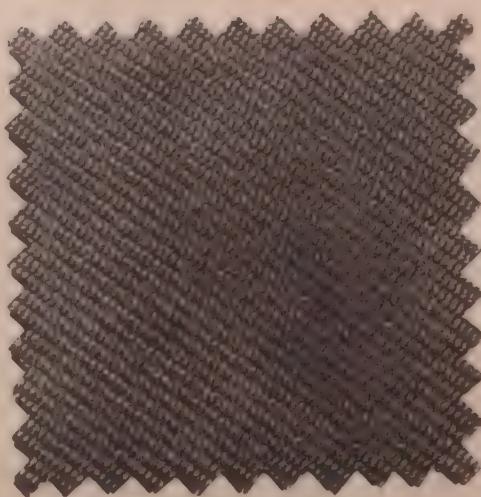


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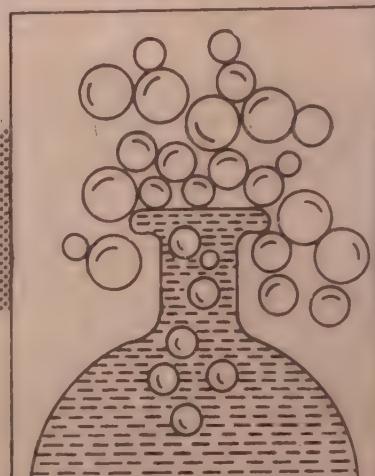
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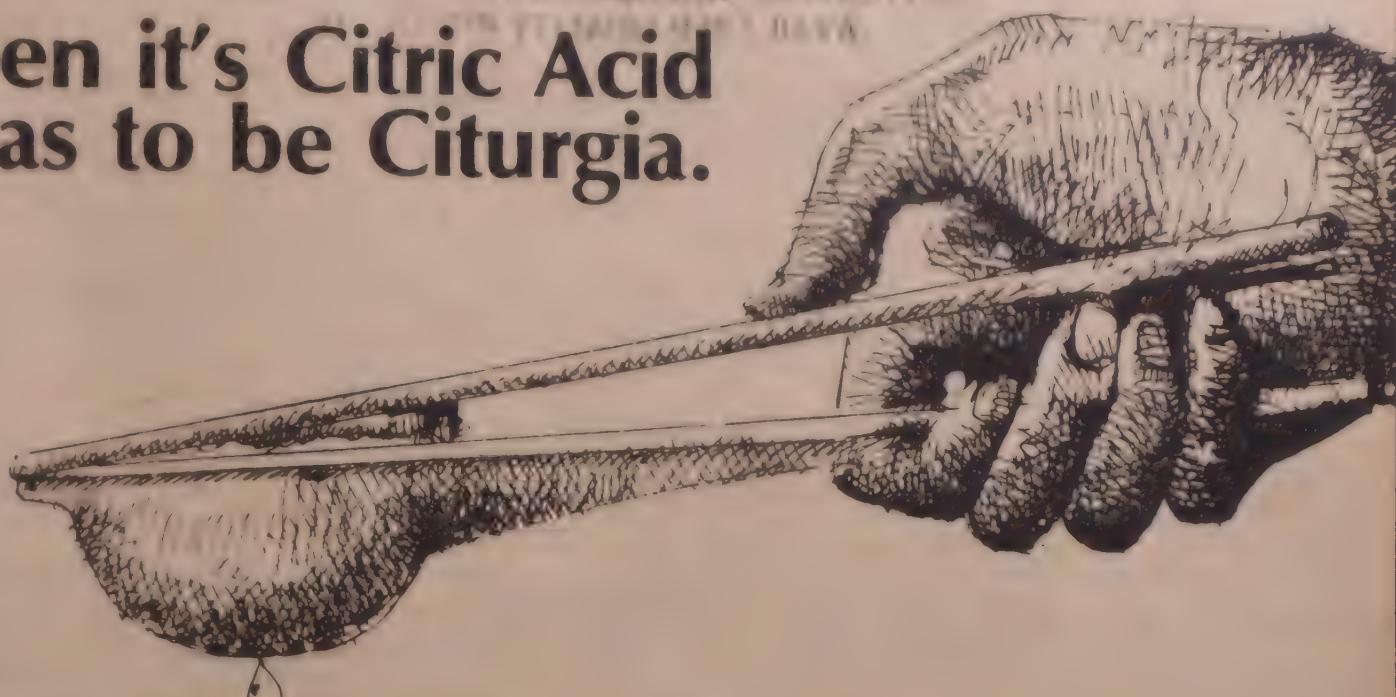
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CHEMICAL WEEKLY

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The Global Manager

The nineties promises to be a wild decade for business. Markets will expand and shrink overnight, driven by technologies that constantly change. New competitors will pop up from unexpected quarters, the world is going to become more competitive in an industrial, commercial sense. More competitive perhaps than we've seen in the history of modern economic society.

The battle is going to require a man or woman at the top very different from the narrowly focussed specialist — the cost-cutting restructurer or the marketing guy — who found favour in the 1970s and 1980s. The leader of the 1990s will be someone who takes a broad view, doesn't harbor many fears and loves to explore the new. He will know how to give away his authority rather than give orders, to skillfully negotiate, and to manage even where he doesn't have control. Most of all, tomorrow's leader will have to have a vision.

The most successful Corporation of the 1990s will be something called a learning organization, a consummately adaptive enterprise with workers free to think for themselves, to identify problems and opportunities, and to go after them. In such an organization, the leader will ensure that everyone has the resources and power to make swift day-to-day decisions. Faced with challenges we can only guess at how, he or she will set the overall direction for the enterprise, after listening to a thousand voices from within the company and without. In this sense, the leader will have to be the best earner of them all. You'd better begin practicing now — the 1990s are already upon us.

The global manager, the pundits say, must be an international chameleon, capable of jumping from Japanese to French to Swahili without missing a beat. Mr. Global has worked in exotic capitals, raised glasses with trade ministers and learned to discriminate between different cuts of sashimi or sauerkraut.

"The global manager is someone who has the ability to manage in new situations, to manage ambiguity, to manage complexity." Those are the same words that describe the manager who can deal with new technology and the demographic diversity in the United States.

America's young leaders believe that the hierarchical model business adopted from the military will soon go the way of the [obsolete] Gatling gun. Holding up the latest ideal in organizational design, the flat organization, many companies have already cut the layers of management between top brass and front-line supervisors from a dozen

to six or fewer. This means that the span of control has broadened, with the number of people reporting to each manager expanding dramatically. It's fine to say tomorrow's manager should oversee the efforts of 300 people rather than 30, but how is he to keep in touch with all of them?

Negotiating, the art of getting people to see where their interests and yours overlap, will become an increasingly important managerial skill. It will be vital to running a team where the manager in charge may not have line authority over other members of the group. Also, in dealing with outside suppliers who should take on greater importance in the years to come. Indeed, in the decade of the 1990s a company may come to look like a brokerage of sorts, or what Dean Raymond Miles of the University of California business school at Berkeley calls a switchboard. Corporate headquarters will be a small office that specializes in, say, design and distribution, and then farms out marketing and even manufacturing.

"The modern manager," says Leonard Greenhalgh, 44, a Professor of management at Dartmouth's Amos Tuck School of Business Administration, "is not this guy in the hierarchical structure. It's the guy who is working with people over whom he has no apparent authority."

Harvard Business School Professor Robert Hayes, 52, considered one of America's leading thinkers on manufacturing, has recently co-authored a book entitled Dynamic Manufacturing: Creating the Learning Organization. In it he dismisses the traditional way of running a factory wherein someone high up thinks of an improvement and then instructs the underlings in it. Instead, Hayes argues, the effective Corporation of the 1990s will be a learning organization, one in which workers teach themselves how to analyze and solve problems. "It's the job of the manager," says Hayes, "to encourage experimentation, to have workers find better ways to do things." Hayes suggests helping workers learn by urging them to visit other factories, trade shows, customers and, if possible, the competition. The true test of the learning organization is whether it holds up under pressure.

Tyrrell believes that employees will put in the effort it takes to work in a learning organization only if they feel they have a stake in its welfare. At American Steel & Wire, everybody, including the CEO, gets the same perquisites, whether it's vacation, profit sharing or health insurance. "The feeling is," says Tyrrell, "if we make it, we all make it together here. There are a lot of executives at other companies who will not give up perks. It's like telling your kids not to smoke with a cigarette in your mouth. If you tell workers, 'We love

you, and you're good, and we want to listen to you,' but you're doing it from a fancy car, they're not going to believe you."

"Today's Chief Financial Officers [CFOs] are winging it. When they look at investment decisions, they look at a few things, not necessarily the wrong things, but certainly not everything." Using programs that ape human thinking, tomorrow's computer will be able to scan the world's financial markets, pick out the best investments and rate them according to risk.

The computers of the 1990s will even help executives think of creative ways to solve problems. "A very good system," he says, "would simply be one that regardless of what you asked for would come up with another way just to remind you there is more than one way of looking at something."

Speed will become an increasingly important weapon in the 1990s, and managers who dawdle are likely to be swept into the dustbin of history. This is especially true in product development, where companies in the 1990s will try to leap-frog the competition with technological improvements and breakthroughs.

Service, Service, Service. With more dual-career couples squeezed for time and baby-boomers hitting their affluent years, American customers in the 1990s will demand better service. "The winners of the 1990s will be those who can boost service and cut prices at the same time."

To do this, one envisions computerized files that will contain a complete profile of each customer — what he bought, his charge-account status and his service record. If someone has a problem with a television bought from Circuit City, he just calls the company's service representative. A computer screen will show the product's serial number and whether it's still under warranty. The system would then forward the information to a service technician, who could quickly check what parts may be needed, and whether they're in stock, before rolling off in his truck to make the repair. The computer would also identify Circuit City's best customers — the retail equivalent of frequent fliers — and give them priority service. If the computer shows that the customer bought a new TV two years ago and a VCR last year, it might dispatch him a flier pitching video cameras.

Tomorrow's leaders will have to find new, more sophisticated ways to reach their customers. "Now we are marketing to several generations of people who have grown up totally on television," says McNamee. "They understand how it works, and you have to give them credit for knowing how it works." Simply asserting that your product is better than brand X doesn't fly anymore. A pitch has to be funny or become part of what the product stands for.

"Good ads define and create the character of the product. In a world of products that look alike and perform pretty much the same, people buy what they like."

He must have the ability to balance the needs of headquarters with those of the corporation's autonomous foreign divisions. Says Marks: "The challenge is to get local ownership of ideas and yet orchestrate and coordinate them globally. As we move to more creative manufacturing processes

if our workers aren't thinking and anticipating, they're never going to be able to make the steps necessary over the next ten to 15 years. That's the problem: The guys who are just out there at companies doing old rote skills, the same thing every day, pressing a button for the machine to go up and a button for the machine to go down. They really never have to think about anything. When the time comes for these guys to run a computer on the floor they're dead."

Tyrell's guys, by contrast, are running computers on the floor. Just before Christmas in 1988 some experts brought new computers into one mill for inventory control, set them up, and began to teach a steelworker the program to run the machine. An executive Vice-President, believes the business world is headed toward more decentralization, with offices, factories and suppliers spread throughout the world — all the more important, then, to be able to move information around the globe faster.

Dealing with diversification, one hears the following revealing idea. "I would rather see our billion-dollar company of the 1990s be ten \$100 million companies, all strong, growing, healthy and aggressive as hell. The alternative is an aging billion-dollar company that spends more time defending its turf than growing."

Beyond Participative Management. The manager of tomorrow must be able to get his people to commit themselves to the business, whether they are machine operators or Junior Vice-presidents. In the 1990s, throwing together a few quality circles won't suffice. The key issue, America's young leaders say, will be empowerment, a term whose strength suggests the need to get beyond merely sharing a little information and a bit of decision-making authority.

This approach, conceived by Rodgers' differs from a traditional divisionalized company because each startup is run by a President who has much greater authority than a divisional manager. He can change product design, build factories, issue stock, raise money, up wages, and hire and fire. Rodgers meets with his four Presidents once a week to see whether there's anything he can do for them. If a President flounders, Rodgers can replace him, which he has already done once. Cypress owns 81 per cent or more of each of the four, with the remaining stock owned by the employees as an incentive."

"For the past few years, we've been discussing a whole series of what one would call macroeconomic or geopolitical issues that are wrapped around terms like globalization, deregulation, interconnectivity, emerging technologies—all 85-cent terms that people like to talk about, that convey something true. As never before, in the 1990s leaders will have to understand what makes people tick, for people will have more choices in the marketplace, more say at work and a greater role in shaping the future of their organizations. "The next ten years," predicts Colgate's Mark, "will have little to do with, 'Well, should we build that plant or not build that plant? It's a whole complex host of issues like who do you promote, who do you give authority to, who do you trust, who do you not trust — all skills developed by dealing with human issues, and by an awareness of history, literature, philosophy and psychology."

— T.P.S. RAJAN

(Condensed from an article in *Fortune* "New Idea for Nine-ties", by BRIAN DUMANE)

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S.L. VENKITESWARAN

India's energy problems

India's energy problem is the subject of a paper by B. Sudakar of I.I.Sc., Bangalore and B.K.B. Rao of I.I.T. Kharagpur in the *H.P.* of April 1990. The situation has worsened drastically after the Iraq Gulf crisis. The achievements of the Seven Plans in terms of improved living standards are far short of targets and expectations. India's per capita consumption of energy is only 200 KWH, far below global average let alone the figure for USA or Europe. The energy goals of 7th Plan are short by 10,000 MW in spite of some good progress. The per capita resources for coal is 1,766 tonnes as against 13,000 tonnes of USA and of oil 0.78 tonnes against 16 of USA. This only falls year after year due to population rise and little of additions to the resource position. The estimates of energy resources (fossil) are as under:

Coal deposits	- 148×10^9 tonnes
Lignite	- 5×10^9 tonnes
Hydrocarbons	- 4.53×10^9 tonnes
Natural gas	- 1.2 trillion m ³
Thorium	- 363,000 tonnes
Uranium	- 80,000 tonnes
Hydroelectric potentials	- 84,000 MW

The electric energy production in India as of 1987-88 and target for 2000 are as under:

	Million units	
	1987-88	AD 2000
Hydroelectric	84,800	88,000
Thermal	130,400	350,000
Nuclear	5,700	50,000
Total	200,900	488,000

Coal and lignite provide 62% of the power generation (60% of coal goes for power). Wood and charcoal are still used in large quantities and deforestation goes on merrily -- 60 to 70 mil. tpy.

Nuclear power is generated in four centres out of which the oldest reactors is due for its final shut down and one of the two in Kota has been shut down after several failures. The ambitious plan for 10,000 MW of new nuclear capacity by AD 2000 is unlikely to be fulfilled. Some standardisation

of designs has helped in speeding up procurement and construction but the controversy on nuclear plants imports from USSR on the pressurised water system as against our framework for heavy water moderation with use of our own natural uranium continues and creates uncertainties. Kalpakkam has an R & D centre and a Fast Breeder Reactor which could enable the ultimate use of our large thorium resources for power generation but this may be in the distant future. Heavy water production has been always behind the requirements which has delayed programmes. Less than 2.5% of power comes from nuclear sources and the immediate objective is to reach 10% -- perhaps early 21st century. In contrast, France is the most advanced with near 55% of power from nuclear plants.

Natural gas was an unexpected bonanza from both the offshore and in Tripura. Years were lost in a policy framework which frowned upon any gas usage other than as a feedstock for chemicals/ammonia. Enormous quantities of associated gas were flared away as this was linked to crude oil production. While power generation from this was finally approved it took more time to take a realistic view of the role that gas could play in India for power generation and a series of such units are coming up along the HBJ pipeline and elsewhere. Even now 28% of the associated gas of Bombay High is flared. The potential from offshore is over 40 million m³ per day but it may be some time before usage can match the availability. In the East coast also the KG and Kaveri basin also gas is available and power generation is approved. The optimum use of gas is years away for the condensables C₂ and higher -- are not yet separated for use for chemicals and leave the "dry" gas (methane) for power/ammonia. The plentiful supplies of gas in the extreme Eastern corner Tripura has little use unless a radical programme for converting it to methanol and use this as liquid fuel in different areas. LPG production and use have been growing at 20% a year and near 2 million tonnes will be used mainly as source of energy for household.

Probably it is in the area of hydroelectric power that we are sadly behind. The installation of high dams and their location have been under critical eyes of environmentalists and years have gone by in giving final clearance for two such mega projects -- Tehri Dam and the Narmada Project -- during

which period costs have escalated by ten times. It is unfortunate that a project for power in the "Silent Valley" in Kerala was torpedoed on environmental grounds even though the "damage" if at all would be of far less magnitude.

Renewable energy from the Sun and wind are talked about

but not likely to be significant for 2 or 3 decades. Agro resources have some limited potential as supplements.

Conservation and higher efficiencies are perhaps most urgently needed in the present context besides wider use of coal after conversion into smokeless fuel.

Biotechnology in Japan

Japan has been at the top in fermentation processes, particularly for amino acids and enzymes. The selection of the best microbial strains and subjecting them to mutation to raise the yield have been the basis for their success. Genetic engineering and recombinant DNA techniques evolved in USA which pioneered biotechnology of this new generation and left the earlier countries like Japan far behind. But in the last few years Japan has been catching up and teaming up with others in the West. Malcolm V. Brock has surveyed the scene in his recent book on 'Biotechnology in Japan'. The basic feature of Japan is the strong collaboration between government, industry and academics which has been responsible for success. The large scale collaborative research between industry (Sangyo), Universities (Gakukao) and Government (Kanryo) is termed San-Gaku-Kan and is the key to success. Brook refers to the system as "Triple N synthesis" of economic, environmental and cultural factors -- Nebukao, Nemawasho and Navabari Arasoi -- which determines and directs all lines of activity and resolves environmental issues from the very beginning. Triple N synthesis is a goal-oriented strategy towards the Sun Rise Industries and has been

adopted for other areas as micro-electronics and newer materials besides biotechnology.

There are non-profit R & D establishments or corporations -- "Key Technology Center", "Protein Research Institute" and others. Over half of the Government funds in Japan go towards applied research and development which enables commercial usage much sooner. Japan has also funded research in US Universities and entered into strategic alliances with top organisations in USA. In Japan, biotechnology is in the hands of large organisations. Mr. Brook discounts some of the apprehensions of what is termed Japan Inc. -- a cartel of industry and government working in tandem and blocking outside entrants. Japan's policy-making and cooperative efforts under the Triple N synthesis between Government, Industry and Academia is what has helped Japan to establish itself once again as a front runner in biotechnology.

One would wish for a clear cut policy and programme in India also on similar lines.

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Expansion of Cochin Refineries cleared

The Rs. 140-crore expansion project of the Cochin Refineries Ltd. (CRL) has been cleared by the Centre. The Union petroleum minister Mr. M.S. Gurupadaswamy told reporters that this would increase CRL's capacity from the present 4.5 million tonnes per annum to 6.5 million tonnes.

He said a Rs. 20 crore joint venture of CRL and the public sector Balmer Lawrie Ltd. for production of polybutyne had also been cleared by his ministry. A proposal for increasing CRL's benzene production capacity from the present 87,000 tonnes to 2,05,000 tonnes at a cost of Rs. 450 crore was under the ministry's active consideration, he said.

Mr. Gurupadaswamy said a Rs. 240 crore diversification expansion scheme of the public sector Hindustan Organic Chemicals' Cochin unit for the Eighth Plan period was being considered. It included a Rs. 159-crore nylon project based on caprolactum. Details were being worked out regarding a proposal to set up a southern gas grid for power generation, in view of the acute power shortage being faced by all southern states.

He said storage capacities of the major oil companies in Kerala were to be increased shortly by setting up more installation facilities. The IOC's storage facility at Palghat would be increased by 3450 kl and at Trivandrum by 6900 kl by 1992 at a cost of Rs. 2.28 crore. A site had also been acquired for setting up storage facility for IOC in Kozhikode district by 1992 he said.

Mr. Gurupadaswamy said the new 1,54,000 storage terminal of the BPC at Irimpanam in Cochin, being set up at a cost of Rs. 71 crore, would be commissioned by August 1991.

By 1991-92, HPC would have a 400 kl storage facility at Neendakara in Kollam district at a cost of Rs. 4 crores.

A 10,000 tonnes capacity new bottling plant of IOC would be ready by January 1991, in Kozhikode he said, adding, a Rs. 18 crore, 25,000 tonnes capacity bottling facility would be set up in Kochi by IOC. HPC would also have a 10,000 tonnes capacity bottling facility in Palakkad by 1991 January.

In response to a request from the Kerala government, the petroleum ministry had agreed to make the allocation of kerosene to the state during various seasons uniform, Mr. Gurupadaswamy said.

DURGAPUR CHEMICALS NOT LIKELY TO OPEN BY JANUARY

Changes of the state-owned Durgapur Chemicals Limited reopening by January are bleak, according to official sources. The plant has been idle for the past eight months with its producing units damaged due to poor maintenance.

An expert committee appointed by the state government some time ago recommended an investment of Rs. 50 crore to revive the sick unit. As a short-term measure, the present management will repair two units, the producers of which have a ready market.

While trade union sources blame the present state of affairs on poor management, a number of officers say the government never really paid attention to the requirements of the thirty year-old plant. The government spends Rs. 50 lakh a month on the salaries and wages of the nearly 800 employees who have no work.

IPCL RAISES POLYMER PRICES

Indian Petrochemicals Corporation Ltd. (IPCL) has revised the sale price of LDPE, PP and PVC following the imposition of the 25% Gulf surcharge by the Union Government on all petroleum products. Following the govt.'s

announcement on Oct. 14, IPCL has suspended sale of the polymers.

HINDUSTAN LEVER PLANT COMMISSIONED

Mr. Wallace Grubman, Unilever Director, said at Madras recently that the inflow of sophisticated technology into India is important not only for its progress but also because of the capacity of companies such as Hindustan Lever to improve upon existing technologies for the benefit of the rest of the world.

Speaking at the commissioning of Hindustan Lever's functionalised biopolymer (FBP) plant at Madras, Mr. Grubman expressed confidence that the well-equipped HLL research centre at Bombay would be able to further improve upon the technology provided by National Starch and Chemical Company of the US for this project.

He also said the products turned out by the new plant would go a long way towards adding value to local agricultural materials, apart from improving the efficiency of the paper and the textile industries. Mr. S.M. Datta, Chairman of HLL, remarked that the small and medium-sized projects are far more important for the country's balance of economic development rather than mega projects alone, which have failed to generate surpluses for growth.

Projects such as FBP have great significance, he said, because with a limited capital of Rs. 9 crores considerable value would be added to local agri-based raw material, thereby giving the local economy a tremendous fillip besides saving foreign exchange about Rs. 15 crores per annum.

By producing industrially valuable intermediates out of low-value agricultural materials, Hindustan Lever hopes to augment the growth of the agri-processing industry which has been recognised by the Government as an area of high priority.

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15 per cent across-the-board hike in drug prices demanded

The joint council of the pharmaceutical industry and trade has requested the centre to allow it an across-the-board 15 per cent increase in prices of bulk drugs and formulations without asking individual units to submit any price revision applications. In a telegram to the Union petroleum and chemicals ministry, the council pointed out that in view of the recent 25 per cent hike in the prices of petroleum products, production of bulk and synthetic drugs would become further uneconomical for pharmaceutical units.

To offset the input cost escalation triggered by the increase in petrogoods prices alone, the industry should be granted an automatic across-the-board 15 per cent enhancement in prices, it said. According to a quick estimate made by the council, the increase in the administered prices of petrogoods will raise the cost of production by 15 per cent. The council felt the government should immediately accept its request to help the industry retain its economic viability.

The council made it clear to the Union petroleum and chemicals ministry that since the industry's operating costs have been pushed up mainly by the government's decision to raise the prices of petroleum products, the ministry should not insist on the pharmaceutical units submitting any fresh price revision applications.

These 15 per cent increase sought this time should be treated independently of the earlier price revision applications submitted to the government by the pharmaceutical units, it has said. With the recent hike, the cost of producing formulations based on petroleum products would go up. Further, the cost of diesel used in gensets, solvents used in fermentation and of other petroleum goods used in various processes and in packaging materials would also go up. According to an estimate, at least 50 per cent of the production cost is made up

of inputs.

Further the freight bill of the industry is also likely to swell with the increase in petrogoods prices, especially in view of the fact that over 90 per cent of the industry's production moved by road. Industry sources are hopeful that the union petroleum and chemicals ministry will view its demand with sympathy this time. They are sore that the government has not been fair to the industry.

OIL PRICE HIKE: IMF PRAISES INDIAN MOVE

Without mentioning India, the International Monetary Fund (IMF) has praised the approach of many countries to pass on to consumers immediately the increase in oil costs instead of loosening monetary policy to accommodate any general upsurge in inflation. "This is a sensible approach although many see it as difficult and unpopular to implement", the IMF Managing Director, Mr. Michel Camdessus said.

India has raised recently the prices of petrol and diesel by 25 per cent leading to an impression in Washington that New Delhi may soon approach the IMF for loan, the conditionality of which the Finance Minister, Mr. Madhu Dandavate, had criticised during his visit to USA last month. Mr. Camdessus, however, held the opposite view. He recalled that people used to complain against IMF for imposing on the countries measures which were not in their 'true interests', "that was, course, a gross distortion of reality" he added.

"Instead, we now see much more acknowledgement that the need for economic adjustment is imposed by adverse circumstances, including past policy mistakes and not IMF", he added. He said the way forward was for countries to adopt strong policies and pursue them steadfastly. The most useful contribution that the IMF could make, was to

support the countries attempt to help themselves.

The IMF chief said he was encouraged by the virtually unanimous view expressed by Finance Minister of the entire membership at the annual IMF World Bank meeting last month. "Countries are determined not to repeat the mistakes of the 1970s, when many of them attempted to cushion the impact of the oil price increase which left unpleasant legacies including deeply entrenched inflation, high fiscal deficits and a debt crisis, he added.

He said IMF was discussing with the countries, affected by oil crisis, how to make their policy and "our assistance, more effective very soon". For the time being, he pointed out, the IMF's resources would be sufficient to provide an appropriate level of assistance to its members until 1993 at least, provided that the quota increase that was recently approved was soon put into effect.

CMRA WINTER CONFERENCE IN SAN ANTONIO

"Plastics & Petrochemicals Growth Opportunities in a Changing Environment" will be the theme for the CMRA 1991 winter conference, scheduled for February 25-27, 1991 at the Hyatt Regency in San Antonio, Texas. Topics to be covered include: February 25 - The economy and major olefins February 26 - Major olefin-based polymers, major aromatics and their polymers; February 27 - Commodity and engineering polymers.

A separate one-day CMRA Business School on "Market Segmentation" will be held on February 27 & 28. It will be taught by Joseph F. Hair, Jr., chairman of the Department of Marketing at Louisiana State University and a noted author, seminar leader, and corporate consultant. For further details and registration information, please contact Mary J. Carrick, Executive Director, CMRA, 60 Bay Street, Suite 702, Staten Island, NY 10301, (718) 878800.

5 per cent ceiling for drug price hike

The Union minister for petroleum and chemicals, Mr. M.S. Gurupadaswamy, has ordered a five per cent ceiling on pharmaceutical price increase regardless of actual cost increases and BICP recommendations, according to informed sources at Bombay.

The directive virtually renders the BICP redundant. For the past several months, the department of chemicals and petrochemicals has been finding fault with BICP recommendations, asking the expert body to recheck its own findings and incorporate extraneous and irrelevant data in its analysis.

When this became a regular trend, BICP chairman Dr. Vijay Kelkar was constrained to write a strongly-worded letter to Mr. M.S. Gill, secretary of department of chemicals and petrochemicals.

The five per cent ceiling on price increases has come at a time when the industry has asked the government for a 15 per cent across-the-board price increase to absorb the cascading impact of the recent increase in administered price of petroleum products.

While every other industry is declaring revised prices to absorb the price hike and surcharge on petroleum products, it is surprising that the government expects the drug industry to hold the price line without assuring supply of its input at controlled prices, industry sources lament.

Transport costs alone have gone up by more than 20 per cent in recent weeks, a leading industrialist said. The entire output of drug industry is moved by trucks to avoid spoilage and pilferage. The price of glass bottles have gone up by more than 25 per cent and the plastic industry has indicated that its packaging material will be costlier by 20 per cent.

The joint council of pharmaceutical

industry and trade has wired the minister protesting against the move for a five per cent ceiling on price increases. "We fail to understand the basis of such arbitrary decision and would urge you to take the actual cost and grant the price increase on urgent basis", it said.

In its recent disposal of price revision applications, the ministry has allowed only two to four per cent price increase, rendering all efforts by BICP officials a waste of time.

In a communication to the minister, the joint council said, "we understand that prices of a number of bulk drugs and formulations are being fixed ignoring the recommendations of the BICP. As you are aware it takes a very long time — several years for BICP to complete various formalities for price fixation including plant visits by experts and verification of production data. We strongly protest against such a decision

of not accepting the BICP recommended price by our ministry which are strictly in accordance with the policy laid down by the government".

It has warned that such actions would discourage production because of unremunerative prices and would ultimately lead to reliance on imports. "There is no purpose in asking the industry to submit price approval applications to BICP and furnish details when its price recommendations are denied without assigning any valid reasons", it said.

The letter goes on to express the industry's lack of confidence in the minister: "you have from various platforms confirmed that you are not changing BICP recommendations. Further, you have on various occasions confirmed that you have an open mind and would be fair to the industry. Our members are perturbed to note from the actions of your ministry that the position is exactly the reverse".

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Prof. Rajadhyaksha is no more

Prof. Rajeev Anand Rajadhyaksha is no more. The brilliant and fruitful career of an able teacher and research supervisor and knowledgeable technical consultant came to an abrupt end on 15th October 1990.

Prof. Rajadhyaksha had been to France about a month ago under a scheme of the Indo-French Centre for Promotion of Advanced Research (which had also instituted a scheme in Bombay University Department of Chemical Technology under his supervision for a duration of three years, the total amount involved being Rs. 8,00,000) and he was returning to India.



Prof. Rajadhyaksha

Early that morning, he had landed at the Sahar Airport, where the hand of

Death cast its invincible shadow on him in the form of a heart attack. Born on 14th Oct., 1950, Prof. Rajadhyaksha left his family, friends and students at a very young age of exactly forty years, leaving behind unforgettable memories.

Prof. Rajadhyaksha, an alumni of BUDCT, got his B. Chem. Eng., M. Chem. Eng., and Ph.D of Bombay University (standing first in the first two examinations).

After completing his doctoral work, he went abroad and worked in the university of Edinburgh and CSIRO, Melbourne for three years. Back in BUDCT in 1980, he successively held the posts of Reader in Chemical Engineering, Professor of Physical Chemistry (1985) and finally Professor of Chemical Engineering (1988). His teaching and research guidance was thus spread over a decade (and could have extended over the next two decades). The past decade saw him elected as 'Young Associate' of The Indian Academy of Sciences (1984), receiver of 'Amar Dye-Chem Award' of the Indian Institute of Chemical Engineers (1985) and elected as Fellow of the Maharashtra Academy of Sciences. He was a technical consultant to Bombay Oil Industries Ltd., Alkylamines and Chemicals Ltd., and Herdillia Chemicals at different times. He had authored/coauthored nearly forty

research publications/chapters in "Recent Advances" volumes, published in India and abroad.

One of his principal research interests has been diffusion and diffusion with reaction in zeolites. Another major area of his interest was catalysis by superacids especially zirconia. Liquid phase catalytic hydrogenation has been another of his interests. His consultancy to the industry has given methods of regeneration and reuse of several industrial catalysts, which have been successfully implemented. In addition to his academic responsibilities, Prof. Rajadhyaksha had been, the Vice-President of the Technological Association (a student body) of BUDCT, and in that capacity had taken active interest in the extra-curricular activities of the students.

Prof. Rajadhyaksha leaves behind his wife and ten year old son and a large number of relatives, friends, colleagues, students and admirers. All in all, his soul (Atma) has completed one of the innumerable phases of an eternal journey, perhaps to start another phase somewhere sometime.

All I can say at this moment is "Rajeev, I miss your ever-smiling face. Anyway, good-bye and good luck next time".

-- V.A. Shenai

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HBJ capacity likely to be doubled

Gas Authority of India Limited (GAIL) is considering increasing the capacity of the HBJ pipeline from the present 18.2 million standard cubic metres per day (MSCMPD) to 40 MSCMPD during the Eighth Plan.

The expansion proposal, which may cost about Rs. 1,200 crore, envisages laying a loop line from Vijaipur to Delhi and branch lines to some cities of Haryana and Uttar Pradesh. Though the HBJ pipeline has been constructed to initially supply 18.2 MSCMPD, it was earlier stated by GAIL that the pipeline's design provides for augmenting the capacity to 33 MSCMPD.

GAIL now feels the capacity can be increased to 40 MSCMPD. GAIL is currently working out the comparative economics of putting up additional compression stations vis-a-vis laying a loop line from Vijaipur to Delhi.

Though the HBJ pipeline has already been extended from Babrala to Delhi, it is felt that Delhi can be fed by laying a straight loop line from the Vijaipur section of the trunk line. This will require less compression facilities.

The cities which are proposed to be supplied with HBJ gas include Noida, Kanpur, Faridabad and Sonepat. Apart from providing gas to some large industrial consumers, GAIL will supply piped gas to domestic and smaller industrial consumers in these cities.

GAIL has already begun the task of contracting out the reconnaissance the detailed route surveys of the proposed pipelines in Delhi, Haryana and UP to engineering service companies. The gas supplied through the HBJ pipeline comes from two sources: free gas reserves of South Bassein and associated gas from Bombay High.

The South Bassein field, in which the Oil and Natural Gas Commission has invested Rs. 907.59 crore, is currently

being tapped partly.

With the availability of large quantities of gas at Gandhar in Gujarat, the prospective market for additional HBJ gas has changed substantially. Earlier, it was anticipated that additional gas supplies from HBJ will be largely consumed in Gujarat. With the planned exploitation of Gandhar reserves, the prospective market for HBJ gas has shifted to hinterland states.

GLOBAL WARMING: JAPAN EVOLVES PROGRAMME

Japan, in an important move to prevent a further increase in its per capita carbon-dioxide emissions at present levels in the year 2000 and beyond, has announced a 20-year action programme to help prevent global warming, caused mainly by the emission of carbon dioxide. The programme, which was approved at a cabinet meeting recently is part of the international effort to preserve the global environment. Japan's 1990 emission of carbon dioxide is estimated at 310 million tonnes, and its per capita emission at 2.5 tonnes, officials said.

Japan's plan will be presented at the second international conference on climate in Geneva, which will discuss global target for reduction of carbon dioxide emissions. Another international conference is scheduled to begin next February in Washington to work out a treaty setting the global targets. The six-chapter Japanese action programme will require the Government to implement two phases of action in the 20-year plan which begins next year through the year 2010.

In the first phase, every possible measure will be taken to stabilise the per capita carbon dioxide emissions, while the second phase is to hold down aggregate emissions through technological development efforts. The new action programme calls for major efforts to

promote development of new energy sources in the second phase to stabilise carbon dioxide emissions at the 1990 level. It proposes urban afforestation efforts, wider use of energy-saving structures, development of low-pollution automobiles and promotion of recycling.

REFINERIES OFFER TO MNCs

Not having the money to buy crude in the international market, India has decided to offer its idle refining capacity to multinational companies. This is the first time that the country is providing its refining capacity to outsiders to make available foreign exchange. Indian Oil Corporation (IOC) is in the international market offering to make available two million tonne capacity during the remaining period of the current financial year.

"This is a sad decision, but has been prompted by our desire to ensure that the idle capacity does not go waste", said a top source in the oil industry. The domestic refining capacity has always been short of the country's requirements. According to the government's original estimate, imports of petroleum products this year would have been about nine million tonnes. The present domestic refining capacity stands at 51 million tonnes against the net projected domestic crude production of about 34 million tonnes. With domestic production failing to catch up with the target, the government will have to import at least 18 million tonnes of crude to fully utilise the domestic refining capacity.

There is no precise estimate of the crude imports this year. It depends on the availability of foreign exchange. As the foreign exchange kitty is depleting fast, the government may prune the crude imports drastically. The government has already announced a 15 percent cut in supplies of petroleum products to various sectors. According to oil industry circles, the possibility of a further cut cannot be ruled out.

Chemical exports may nosedive: Chemexcil

Exports of basic chemicals and pharmaceuticals are likely suffer a calamitous fall to about Rs. 1,500 crores in 1990-91 from Rs. 2,118 crores reached in 1989-90, consequent to the Indian products becoming uncompetitive in the world market after the imposition of 25 per cent surcharge on the prices of petroleum products, according to Chemexcil.

Members of Chemexcil, who have increased exports of basic chemicals, pharmaceuticals & cosmetics from the low level of Rs. 783.3 crores in 1987-88 to Rs. 2,118 crores in 1989-90, were hoping to achieve exports worth Rs. 3,050 crores — a 44 per cent rise — in 1990-91.

The sharp price increase of petroleum products by as much as 25 per cent now will render Indian exports totally uncompetitive. In view of this, exports may suffer a shortfall of more than Rs. 1,500 crores in the targetted export of Rs. 3,050 crores, according to Mr. Ramu Deora, the newly elected president of Chemexcil.

The main inputs of basic chemicals are solvents and intermediates. The government has exempted units in Free Trade Zones from 15 per cent across-the-board cut in supplies, but has completely overlooked the 100 per cent Export-Oriented Units (EOUs).

Supply of inputs to other exporters are strictly restricted to the average off-take of the past three years, and are never relaxed even on production proofs like advance release orders, L/C etc.

For sustaining the growth of exports, Mr. Deora has suggested three measures: (a) no curbs should be imposed on consumption of inputs for export production, (b) Additional supply of inputs of upto 40% should be made to exporters if their performance this year and in the past three years was good and (c) supply of petroleum and petrochemi-

cal products should be closely monitored, so that minor administrative matters and red-tape would in no circumstance disrupt export production.

HINDUJAS, AUSTRIAN OIL COMPANY JOINT VENTURE

The Hinduja Group and OMV, a leading Austrian oil company, have launched a joint-venture to blend and market lubricants. The new company, Gulf Oil International GmbH, owned in equal parts by the two groups, will initially blend and market their lubricants in Asia, the Middle East and Latin American countries, according to a press release issued on October 18 by the company.

The joint venture's objective is to expand the marketing of Gulf lubricants and other Gulf branded oil products throughout the world. The necessary product technology services will, hence-

forth be supplied from OMV's substantial research and development centre at Schwechat, near Vienna, the release said.

DMT PRICE HIKE

IPCL and Bongaingon Refineries, both public sector DMT producers, have hiked their price from Rs. 27,000 per tonne to Rs. 32,000. Bombay Dyeing, the only DMT producer in the private sector, is expected to follow. According to DMT consumers, the company is expected to hike the price around the levels of Rs. 32,000 per tonne with retrospective effect from October 15, 1990.

DMT and PTA are basic raw materials for polyester industry and Reliance Industries, the lone PTA producer in the country, is likely to raise its selling price soon. The revision in the price of DMT/PTA has been necessitated by the government decision to raise the prices of petroleum products by 25 per cent.

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Easier licensing norms for bulk drugs

The union government is willing to liberalise licensing procedures for manufacture of priority bulk drugs which do not involve imports or outgo of foreign exchange.

Licensing liberalisation will however, be on the condition that drug and pharmaceutical units keep aside at least 20 per cent of their production capacity for production of essential bulk drugs and their formulations. This apart, the ministry of health is also considering linking approvals and licenses in future to putting up adequate quality control equipment in the project.

Mr. Rasheed Masood, Union Minister of State for Health and Family Welfare, said on October 30 in Calcutta that the government will make all efforts to implement Drug Price Control Order (DPCO) 1987 by strengthening the mechanism for speedy revision of prices and making them less cumbersome for the drug industry. He was inaugurating a seminar on health care systems organised by the West Bengal unit of the Indian Drug Manufacturers' Association (IDMA).

The government, Mr. Masood said, would also ensure that price levels were fixed to maintain profitability of the units as envisaged under DPCO. Apart from strengthening the Central and State drug control organisations, the government also expected the drug industry to set aside a part of its funds for creating the necessary infrastructure for quality control which would be closely linked with drug control organisations at the Centre and the States.

Such facilities were all the more necessary in those areas where advanced quality control equipments were found to be inadequate.

The Centre believed that the country did not need to import any equipment for such laboratories and qualified chemists, biochemists and pharmacists

were also available in abundance in the country.

The minister said the drug industry would do well to exercise caution while investing in production of drugs which were likely to be out-dated by new and advanced drugs from developed countries. Care would also have to be taken while investing in making drugs which were found to have toxicities. The government would take all these factors into account while deciding on licenses, re-endorsement of capacities and import of technology.

Mr. Masood said the drug industry could also assist in preparing a standard list of essential drugs by covering retail drug outlets to ascertain marketing, distribution and the use of drugs in each area. This would go a long way in avoiding shortages of priority drugs in the market and health service centres.

Speaking on the occasion, Mr. Prasanta Sur, the West Bengal Minister for Health urged the Centre to set up an institution on the lines of the All-India Institute of Medical Sciences (AIIMS) in West Bengal.

The state health minister also suggested that a National Drug and Food Authority be set up in India to co-ordinate and dictate policy. This apart, the state government also urged the Centre to look into the matter whether food and drug control should be brought under a single authority all over the country.

Mr. Sur also urged the Centre to adopt a liberal approach in granting Directorate General of Trade and Development (DGTD) licenses to drug makers in eastern India. Even after the installation of the National Front government at the Centre, there was hardly any representation from eastern India on the various expert committees on drugs and pharmaceuticals, he added.

The state health minister pointed out that a pragmatic and rational drug policy needed to be evolved under the overall charge of the National Drug Authority of India, a concept which had been put forward by the Hathi Committee. This proposed authority would deal with inputs, pricing, production, imports and all other matters of the drug industry. He said of the 10,000 drug units in the country, only about 150 were in the organised sector. He called upon the industry to examine whether so many thousands of formulations were required when the World Health Organisation (WHO) had made a list of only 280 essential drugs.

IDMA President, Mr. N.I. Gandhi called for "freeing" the drug industry from the "shackles" of control on production and profitability. Mr. Gandhi said that the drug industry was "nowhere near the profitability ceiling" prescribed under Drug Price Control Order.

Calling for gradual abolition of price controls, he said, what was needed was a check on the rising cost of raw material for drug production and reduction of taxes on medicines. "Out of every rupee the consumer spends on medicines, nearly forty paise goes to the Government by way of various taxes", Mr. Gandhi pointed out.

BRPL DIVIDEND

The Minister of Petroleum and Chemicals, Mr. M.S. Gurupadaswamy, received a dividend cheque of Rs. 7.99 crores for the year 1989-90 from Mr. P.K. Pai, Chairman and Managing Director, Bongaigaon Refinery and Petrochemicals Limited (BRPL) at New Delhi on October 23.

During 1989-90, the company set new records in physical and financial performances. It processed a record throughput of 1.21 million tonnes which was 4.3 per cent higher than in the previous year.



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Polymers use may go up

The consumption of polymers in the country is expected to grow at the rate of 12 per cent amounting to 12 lakh tonnes per annum during the next three to four years, according to Mr. T.C. Dutt, Chief Secretary to the Government of West Bengal and Chairman of Haldia Petrochemicals Ltd.

Inaugurating a seminar on developmental perspective in petrochemical industries, Mr. Dutt said the country produced three lakh tonnes of polymers as against the annual consumption of eight lakh tonnes. The rest is being imported.

The seminar was organised jointly by the Institution of Engineers, (India), West Bengal State Centre, Indian Chemical Merchants and Manufacturers Association in collaboration with the Small Industries Service Institute, Departments of Commerce and Industries and Cottage and Small-Scale Industries, Government of West Bengal.

With the completion of HPL and the Reliance Industries at Hazira, by the middle of this decade, the capacity of polymer products would be increased by an additional eight lakh tonnes, he said.

Stating that the downstream use of polymer products are essentially confined to the small-scale sector, the Chairman of HPL said only less than 15 per cent of polymer processing industries were located in eastern India while 45 per cent was concentrated in Gujarat and Maharashtra.

With the completion of the Haldia project, the imbalance in petrochemicals production would be restored to a greater extent, he said. Global tenders for setting up of catalytic cracking unit at Haldia were being processed and a decision would be taken within five to 10 weeks.

Referring to the progress of the Rs. 3000-crore project, he said prelim-

inary work had already started. The piloting work is expected to start immediately after the monsoons are over. An executive committee of management has been set up and the board reconstituted, according to Mr. Dutt.

The product range scheduled to come out through the process of naphtha cracking includes ethylene (3 lakh tonnes), propylene (1,50,000 tonnes), butene-1 (11,000 tonnes), butadiene (53,000 tonnes), benzene (65,000 tonnes) and acetylene (5,300 tonnes) per year.

The main products scheduled to be produced are HDPE (1,00,000 tonnes) LLDPE (160,000 tonnes), polypropylene (1,50,000 tonnes), polystyrene 75,000/65,000 tonnes), polybutadiene rubber (50,000/45,000 tonnes), styrene (13,000 tonnes) and acetylene black (4500 tonnes).

The by-products include CR raffinate, pyro-gasoline, fuel oil and aromatic rich naphtha. Mr. Dutt called upon the entrepreneurs to come forward and start setting up downstream processing units once the project was completed and added that there was great scope for employment in these units.

Naphtha cracking: Need to evolve new alternatives

A well-known chemical expert says there is an overemphasis in the Rs. 3000 crore-Haldia Petrochemical Complex project on naphtha cracking which may militate with the overall supply position in the country threatening to jeopardise the project in the long run.

Prof. Manindra Mohan Chakrabarty, known for pioneering chemicals and oil and fat-related work said that the West Bengal Government and Tata Tea would do well to evolve alternatives to naphtha cracking.

Delivering the key-note address in an all-India seminar on "development per-

spective in petrochemical industries", Prof. Chakrabarty said the possibility of cracking through coal or natural gas routes should also engage the promoters' attention. Otherwise, periodic shortage of naphtha in the world market and other problems would surely reflect on the supply of naphtha. The naphtha available in the domestic market would not be adequate to cope with the cracking demands of all the country's petrochemical projects. A large number of chemical engineers and technologists were present at the seminar. Prof. Chakrabarty said India is rich with coal and natural gas which should be used as feedstock. In fact, a change in emphasis would put a stop to flaring of natural gas. As he saw it, the two promoters would not have much difficulty in obtaining gas supplies from Tripura.

"Despite the Centre's assurance relating to supply of naphtha, I disagree with the emphasis," he said. In support of his contention, Prof. Chakrabarty said a number of Asian countries like Malaysia and Indonesia had been using the coal route without taking recourse to hydrocarbon reserves.

According to him, there should be an emphasis in the project on manufacture of derivatives keeping the pharmaceuticals industry in view. The project, he said, emphasised mostly plastics and rubbers and not on petroleum-based products which leads to making of agricultural chemicals, industrial explosives, acetylenic chemicals, lubricants and gasoline additives.

US DRUG CO. FINED \$ 1 M

A Federal Judge in Baltimore U.S.A has fined a drug manufacturer \$1 million, the largest penalty so far in the government's investigation of fraud and corruption in the generic drug industry. American Therapeutics Inc. of Bohemia, New York, pleaded guilty to paying more than \$60,000 in illegal gratuities to Food and Drug Administration (FDA) chemists.

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Molasses Control Act under review

The Kerala Chapter of the Chemical Industries Association, held a get-together meeting with Union Minister for Petroleum and Chemicals, Shri M.S. Gurupadaswami at Cochin on October 21, 1990. Earlier welcoming the guests, Shri P.K.N. Panicker, Vice-President of the Association, put forth certain proposals to the Union Minister.

Southern gas grid

There has been a substantial increase in the availability of natural gas in recent years. The construction of the 1860 km. HBJ gas pipe line with 30 MCMD capacity and commencement of production of non-associated gas from the South Bassien are important and bold steps. The gas reserves in India have been in the range of 80 to 86% of the crude oil reserves.

The ratio of crude oil to gas, in the region of 1.0:1.2 is almost similar to the reserves in other parts of the world. However, the Indian utilisation of gas represents only about 3 per cent of the total energy mix whereas it is around 18 per cent or more in most of the developed nations. According to ONGC, use of Natural Gas in 1989-90 has helped to effect an estimated savings of Rs. 1,875 crores in foreign exchange. However, unfortunately due to lack of infrastructural facilities, gas worth Rs. 5,000 has been flared during the last five years.

The South Western Region of the country starved of energy, particularly being situated far away from coal fields,

eagerly awaits for another bold step from the Government to utilise the gas that is being flared today. A study conducted has suggested the implementation of a Gas Grid connecting Bombay South to Bangalore with pipeline network extending to Thiruvananthapuram.

A slightly different scheme is suggested herewith. Implementation of a 1,200 km. pipeline from Bombay to Tuticorin along the route of Konkan Railway Line now being taken up, be planned without delay. The pipeline along the railway route and construction work synchronised with the work of the railway line is bound to result in considerable savings in cost, particularly taking into account the difficult terrain in the region that has to be crossed. Such a gas pipeline with a few branch lines in the first phase can serve Western Maharashtra, Coastal Karnataka, Goa, Kerala and Tamil Nadu.

Multi product pipeline

Another aspect that needs attention is the transportation of petroleum products. Madras Refineries, Cochin Refineries and the proposed refinery at Mangalore will be meeting the requirements of various petroleum products in the South. Perhaps a new mini unit may be added shortly at Tanjore in Tamil Nadu.

However, Coimbatore and Bangalore are two major consuming centres. The Government immediately should look into the possibility of laying a multi-product pipeline connecting Cochin,

Crude oil reserves as reported in the period 1982-87

Year	Crude oil (MMT)	Gas (MMTOE)	Gas reserves (% oil)
1982	480	378	80
1983	526	428	81
1984	511	430	84
1985	500	431	86
1986	558	447	80
1987	581	487	84

Coimbatore, Mangalore, Bangalore and Madras.

In the Indian context of low availability of petroleum resources, tropical climate and abundant monsoon to sustain a substantially good sugarcane crop, it was indeed wise on the part of the Indian Economic Planners to consider and accept alcohol as a chemical feed stock. A large number of alcohol based chemical industries have come up in the country during the last four decades or so. Today a little over 600 million litres of alcohol is being consumed by the Indian alcohol based industries.

In the absence of this usage, the burden of the country with respect to petroleum, would have been higher to the extent of approximately 1.8 million tonnes of ethylene equivalent per year or at the present ethylene price of approximately 900 million U.S. dollars per annum. This aspect of contribution from alcohol to the national economy, particularly to ease the pressure on foreign exchange, is not being appreciated by the country's political leadership.

The recent judgement of the Supreme Court is a positive step and will enable the Central Government to take very effective steps in further utilization of industrial alcohol as a chemical feed stock. Unfortunately many State governments are violating the Supreme Court Judgement and are taking steps which can be termed as retrograde and against national interest. We strongly condemn the tendency of the State government to divert industrial alcohol from sugar cane molasses, the price of which is controlled by Government of India at a low level to ensure alcohol at reasonable cost only as an industrial feed stock, not for potable purposes.

We feel that the Central Government should bring industrial alcohol under Central Excise Control and Review, the production and allotment of Alcohol for industrial purposes be framed on the basis of a National Alcohol Policy.

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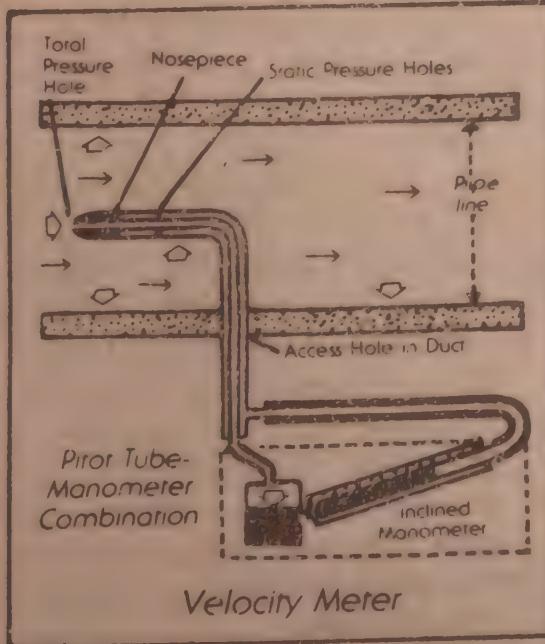
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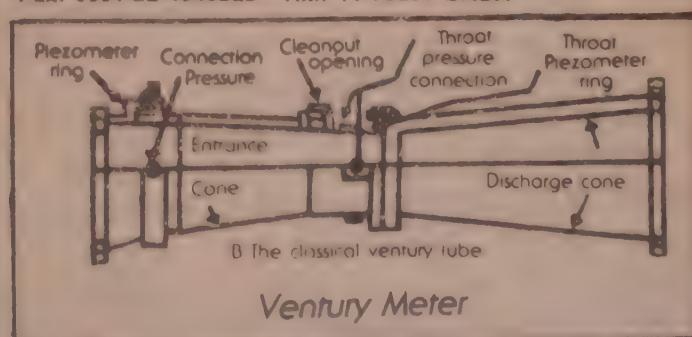
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The other alternative will be to allow import of alcohol on OGL without duty as alcohol may be cheaper to import in comparison with import of petroleum-based intermediates like EDC or VCM.

Ethylene

An alcohol based ethylene plant is viable at a capacity of even 12,000 tonnes per annum. The technology for ethylene generation is available and well established in India. It is possible to create a few ethylene plants in Maharashtra, U.P. and Gujarat for the fullest recovery of a scarce raw material. This attempt would be fruitful only with the full backing of the Government of India.

Irrational price increase of petrochemicals

Mr. Panicker also drew attention of the Minister to the irrational price increase of certain petrochemicals like methanol by some manufacturers and requested the Minister to see that at least the public sector units under the control of his Ministry be advised not to resort to such irrational hikes in prices of their products.

Chemical raw material stockyard

Organisations like HOC, IPCL etc., may be induced to set up chemical raw material yards in centres like Kochi, Madras, Coimbatore, Hyderabad etc. and even at port centres for liquid products like methanol from where the essential feed stocks can be supplied to the consuming industries, particularly for those in the small and medium sectors. Such an arrangement is bound to give considerable advantage to small and medium scale industries.

With the experience gained in catalysing regular bulk quantities of imported methanol to the storage near Madras and Mangalore Ports for the past four years facilitating supplies to all ranges of consumers the Association is now inducing the Western-based methanol producers to bring some stocks by ocean route to South Indian Port based storage stockyards, to avoid the unnecessary

and heavy road transport haulage.

Proposed changes in the customs duty structure

VCM which is the penultimate stage of manufacture of PVC attracts a customs duty rightly of 10 per cent whereas EDC, 1.78 Mts of which has to be utilised for making 1 ton of VCM, has a tariff of 25 per cent. In essence, for the import of an earlier stage intermediate which will expend far less foreign exchange, the duty component is 42.5 per cent. It might happen the duty structure will drive some PVC manufacturers to prefer to import VCM rather than EDC. The duty on EDC should at no time exceed the duty on VCM to ensure that economic activity is enhanced in this country. Similar is the case with another very important polymer namely polyurethane which has uses ranging from thermoplastics to rigid insulations where customs duty on finished polyurethane qualities such as thermoplastic polyurethane for certain applications like electronics and ONGC, has duties as low as 25 per cent whereas the raw materials for making polyurethane productions like MDI and polyols, attract as much duty as 115 and 145 per cent respectively. The effect of this obviously would be to import finished products rather than attempting to augment the manufacturing activity in the country. This is a serious problem which requires the Ministry's immediate attention to set things right through Commerce Ministry.

Dr. D.M. Mohunta, Vice-President of the Association, submitting a memorandum to the the Union Minister pleaded for a reconsideration of across-the-board 15 per cent cut in furnace oil.

Shri. Gurupadaswami, assuring the Ministry's best consideration to the various proposals put forth at the meet added that the country was facing a serious resources crunch, and as such all the petrochemical projects envisaged cannot be cleared within a specific time-frame of 5 years. Already the Gov-

ernment of India had cleared Manali Petrochemicals' Aromatic Complex and the RPG-Linde export-oriented petrochemical plant at Madras.

The Government of India had decided not to impose the 15 per cent cut in furnace oil for 100 per cent export oriented units and those in the free-trade zones. For other industries suggestions on the furnace oil problem will be considered within the purview of the 15 per cent already announced.

The Government was already working on the feasibility of the Southern Gas Grid. The proposal for a multi-product pipeline was not in consideration yet. However, the minister said that it is a new and interesting proposal. It would be looked into, subject to feasibility and resources availability. The Government was also reviewing the Molasses Control Order. He assured the gathering that quite a few petrochemical projects would be considered in the Southern sector, by his government. Shri S.P. Lalan, secretary of the Kerala Chapter of the Chemical Industries Association proposed a vote of thanks.

MMTC REVISES SULPHUR, ROCK PHOSPHATE PRICES

The pricing committee constituted by the government has reviewed selling prices of the Minerals and Metals Trading Corporation (MMTC) for sulphur and rock phosphate for the quarter October to December 1990 with effect from 1st October 1990. Sulphur for fertiliser will be priced at Rs. 2,429 per tonne at high seas, Rs. 2,703 ex-jetty and Rs. 2,793 ex-plot. For non-fertiliser use, sulphur at high seas will cost Rs. 2,679, ex-jetty at Rs. 2,953 and ex-plot at Rs. 3,043 per tonne. Rock phosphate (SSP grade) will cost Rs. 1,190 and Rs. 1,433 per tonne at high seas and ex-jetty respectively. According to an MMTC press release the above prices are exclusive of sale tax, octroi duty etc, which are extra actuals.

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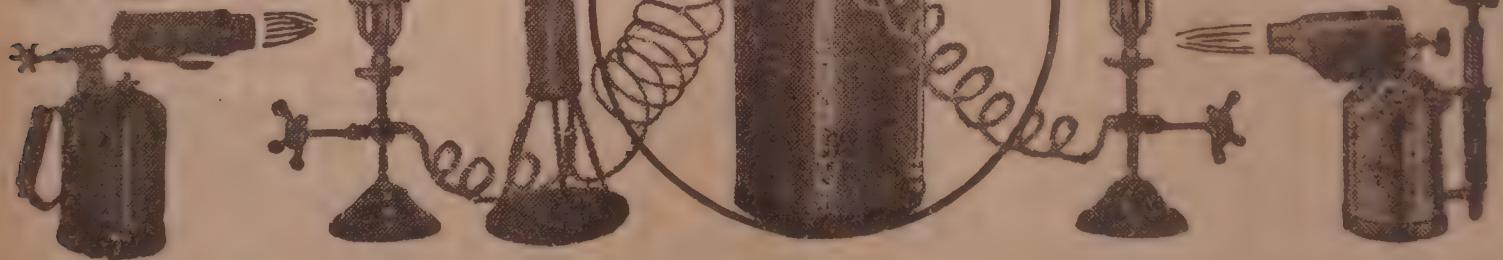
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GODAVARI FERTILISERS

Raw material shortage may force shutdown

With the final shipment of contracted raw materials docking on October 18, Andhra Pradesh's sole di-ammonium phosphate (DAP) producer is heading for shutdown by the month end. Together with stocks in hand, the last shipment of 8,000 tonnes of phosphoric acid and 2,000 tonnes of ammonia will allow Godavari Fertilisers and Chemicals (GFCL) to operate its plant at Kakidada for just another fortnight.

For the three-lakh-tonne unit which has notched a record production of 1.73 lakh tonnes in the first half of this year to cross the total for the whole of 1989-90 this is indeed a severe blow. "Unless emergency supplies of the vital inputs are arranged we will have to close our plant at the end of October", aid the managing director, P.C. Parakh.

The current year was expected to have been a turning point for the Rs. 108-crore project which went into production just over two years ago. Periodic shortages of phosphoric acid have sent its normally efficient operations into a tailspin and also upset its expansion plans. This includes the setting up of a captive phosphoric acid plant with a capacity of 3.5 lakh tonnes and an ammonia-urea plant originally estimated to cost Rs. 800 crores.

Both projects have since been modified in view of the cash constraints at GFCL, which had anticipated reserves of Rs. 25 crores by now.

Instead the company had accumulated losses of Rs. 28.20 crores for the year ended March 1990. This figure could well increase this year despite the flying start made by GFCL in 1990-91. According to Mr. Prakash a provisional profit of Rs. 3.21 crores made for the first half of the year when capacity utilisation was above 100 per cent. In fact an all time production of 37,000 tonnes

was notched in August this year, owing to exceptionally good raw materials supply position.

The Gulf crisis however has thrown a spanner into the works. GFCL is among the handful of fertiliser units which face an uncertain future owing to the clamp on raw materials imports. While the centre has put imports of eight lakh tonnes of phosphoric acid on hold, supplies of ammonia are also running out.

Although the foreign exchange shortage responsible for the petering out of imports, industry sources lament that the vital fertiliser sector has been left headless for several months. Since the resignation of deputy Prime Minister, Devi Lal there is no minister in charge of fertiliser nor has there been a secretary for

the ministry during the past several months.

The company already has a claim for compensation pending with the centre for loss of production last year when it could operate at only 58 per cent of capacity owing to a shortage of raw materials. Although imports of DAP may prove marginally cheaper the cost to the nation in terms of unutilised domestic capacity should outweigh such considerations, Mr. Parakh emphasised.

The financial constraints have forced GFCL, a joint venture between the state government and the Indian Farmers Fertilisers Co-operative IFFCO, to re-examine its plan to set up the Rs. 300 crore phosphoric acid plant.

Mr. Parakh disclosed that one of the options being considered is to let IFFCO to set up a much larger plant to service the needs of both GFCL and IFFCO's unit at Kandla.

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"All the same we have not put our plan to have a captive plant into cold storage. The technical, materials handling and environmental aspects of the project are being evaluated by different consultants and we expect to take a decision soon". As for the ammonia-urea plant, the project has been scaled down to a 450/900 TPD gas-based unit with an investment of Rs. 350 crore from the earlier 1350/2200 TPD costing Rs. 800 crore. The government's approval for the revised application is expected shortly, Mr. Parakh said.

Rs. 150 CRORES FERTILISER SUBSIDY HIKE LIKELY

The 25 per cent Gulf surcharge on prices of petroleum products will mean a whopping Rs. 150 crore increase to industry sources. Further, a 15 per cent cut in feedstock will translate into a seven per cent fall in production of nitrogenous fertilisers. And to fill up this gap, around Rs. 372 crore worth of fer-

tiliser imports will have to be undertaken every year.

It is calculated that the ex-refinery price of naphtha will go up by around Rs. 500 per tonne as a result of the price hike. As fertiliser units consume two million tonnes of naphtha per annum, the additional cost will work out to Rs. 100 crore. Similarly, the price increase in fuel oil will be approximately Rs. 330 per kilo litre, which will mean an additional outgo of Rs. 40 crore on consumption of 1.178 million kilo litre of oil.

The total impact as a result of the ex-refinery hike in prices thus comes to Rs. 140 crore. This does not take into account the additional costs that will have to be incurred on items like higher cost of transport and local taxes. In any case, the industry argues, that the payout by the Central government by way of larger subsidy will be higher than the net revenue out of the price hike to the

exchequer.

The higher subsidy will not only be on account of elements like higher local taxes due to feedstock price hikes and increases in raw material transport rates but also because of higher-freight charges for transportation of finished goods and for running of miscellaneous equipments like generator sets for captive power consumption. The railway had followed the practice of exempting fertilisers from freight hikes, but this was discontinued since 1981.

The industry is not yet clear about whether a 15 per cent cut on supplies will also apply to fertilisers. There seems to be some confusion over whether the government had at all imposed a cut on supplies. But working on the assumption that the supply cut applies to fertiliser units as well, the foreign exchange impact will be substantially higher than if these units were exempted from the cut.

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SUPPLY OF PLASTIC RAW MATERIAL TO 20 COMPANIES Hyundai refuses to honour commitment

Hyundai Corporation of South Korea has refused to honour its commitment to over 20 Indian companies to supply plastic raw materials at prices mutually agreed upon in confirmed letters of credit.

In the second half of August, Hyundai's Bombay office had booked orders for supply of high density polyethylene through its Indian agent at US \$ 975 a tonne. This was several weeks after Saddam Hussain's August 2 invasion of Kuwait, triggering off an immediate flare up in global petrochemical prices. Indian buyers had opened irrevocable letters of credit for October delivery.

Hyundai's Bombay office has now telexed its clients that supplies are possible only if they agree to a higher price of US \$ 1,220 c&f. Hyundai's explanation is that 2,000 tonnes meant for October shipment was to be sourced from China. Chinese authorities have unilaterally revised their contract to about 1,280 a tonne, and as the material has become scarce in the global market, Hyundai is helpless.

Mr. I.K. Han, general manager of Hyundai Bombay office, has sent an identical telex on Oct. 13 to all affected parties. "We very much regret to inform you that the Chinese government authorities one-sidedly dishonoured our contract terms and conditions and cancelled all export licences, issued earlier for export of petrochemical products due to present serious shortage and considerable price hike all over the world, caused by the Gulf crisis."

At the moment, all international stockists and distributors are in China and are bidding at much higher prices to secure materials desperately. To make our situation more worse (sic), all Indian traders are also in China and they submitted price over \$ 1250 c&f Indian port". It goes on to guarantee supplies

at \$ 1220.

The list of affected units include Shanti Packaging Pvt. Ltd., Planters Polysack, Jai Fibres and Goldcoin, all based in Bombay. Not all of them believe that Hyundai's explanation is true. They also know that if they seek legal redress, the courts will decide in their favour. Many have agreed to amend the LCs for the higher price, as they are desperately in need of material and have no time or money for a protracted litigation.

The victims are upset because on the one hand, they have committed to supply processed products to their customers on the basis of the earlier price. They cannot pass on the higher price to their clients now. If they do not comply, they have to chase supplies at much higher prices. Even at the higher prices,

tape grade HDPE is scarcely available in the global market. The price increase of \$ 245 per tonne will mean a foreign exchange outgo of \$ 12,25,000 on a small quantity of 5,000 tonnes.

Hyundai's I.K. Han said that except for Jai Fibre Ltd., all other clients understood their position and have willingly agreed to amend the LCs. "This sort of thing is happening for the first time. Had the material been of Korean origin, we would have supplied the material without any increase", he said.

Only two weeks ago, Hyundai distributed Korean material at \$ 850 a tonne, Mr. Han said. His company had taken up the matter with the Korean government. It remains to be seen whether the Korean government can do anything in the absence of diplomatic relations with mainland China. "Our head office director and senior managers are stationed in China and are trying their best to solve the problem", he said.

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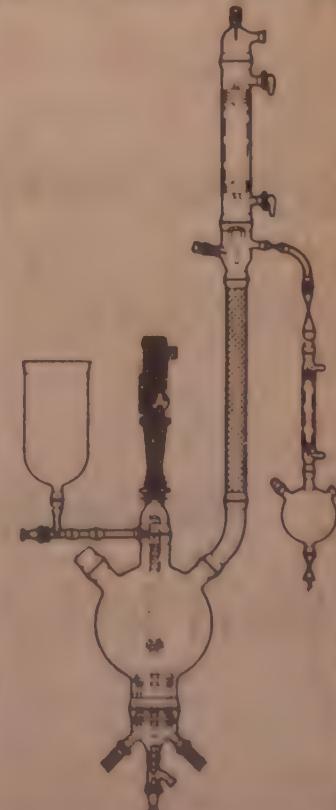
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Mr. Han said Hyundai was not passing on the entire additional burden to its Indian customers. "We are sharing our loss with them. We stand to lose approximately \$ 150,000 in this deal", he claimed. "We want a long-term relationship with India and are fighting for our customers here", he said. Hyundai Petrochemicals will commence production next year, with a capacity of five to seven lakh tonnes of polymers a year. Out of this, the company has earmarked 10,000 tonnes of polymers for export to India every month. Mr. Han said some other export houses were in the same predicament and were sharing the additional costs with Indian buyers.

A spokesman of Jai Fibres said the company would seek legal redress whatever be the cost and time involved. Some other processors also feel aggrieved over the fact that enforcement agencies like the Reserve Bank of India, Directorate of Revenue Intelligence and Central Bureau of Investigation take Indian companies to task for minor vio-

lation of laws, and leave alone foreign trading houses, who violate international laws. Jai Fibres is seeking legal counsel and is ready to file a case in an international court if need be, company sources said.

PIL HIKES HDPE PRICE

Polyolefin Industries Ltd. (PIL) has increased the basic price of high density polyethylene (HDPE) by Rs. six a kg. following the upward revision in ethylene price by National Organic Chemical Industries Ltd. (NOCIL), its sister company. NOCIL had increased the price of ethylene from Rs. 9,542 to Rs. 11,500 a tonne to absorb the increase in administered price of naphtha and other petroleum based inputs. PIL is dependent of NOCIL for its total ethylene requirements. The revised HDPE price ranges from Rs. 38 to Rs. 41 a kg for various grades. PIL's revised prices are, however, lower than the prevailing open market prices. Some processors fear that clients may change

over from plastic to conventional packaging materials if the prices of polymers continue to rise.

For example, the latest offers for HDPE woven sacks for cement is Rs. 6.50 a bag. The difference between plastic sacking and jute sacking has narrowed down to 50 paise. Similarly, rise in input costs has pushed up plastic sack price for the fertiliser industry to Rs. 10.50 to Rs. 11 per bag. Jute counterparts for fertiliser packing costs Rs. 11.50 to Rs. 12 per kg.

GAS STRUCK IN K-G BASIN

Gas has been struck at one more structure in the Krishna-Godavari Basin in Andhra Pradesh. From the first well at Manepalli in Razole Island block gas has been estimated to be flowing at 185,228 cubic metres a day along with 65 barrels of condensate, according to the Oil and Natural Gas Commission.

The total hydrocarbon reserves of the Manepalli structure which covers a five kilometer area has been put at 1.5 million tonnes. With this latest gas strike industrialisation in Andhra Pradesh is expected to get a big boost. Even as of now, gas from this basin is being supplied to various industries and the Andhra Pradesh Electricity Board. According to ONGC, efforts are also on to put on production the Ravva structure, a major success story as far as offshore hydrocarbon structures are concerned.

DUTY RISE ON PLASTIC WOVEN SACKS RESENTED

The doubling of the excise duty from 15 per cent to 30 per cent on plastic woven sacks and withdrawal of modva credit facility will cripple the industry. Mr. M.M. Sud, president of the All India Flat Tape Manufacturers Association, said. The association, he said, has already filed a case in the Supreme Court challenging an earlier government order which curbed the use of plastic woven sacks.

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Petro-products price hike will stay

The prices of petroleum products might not be brought down even after the Gulf crisis is resolved, according to the Union Minister for Petroleum and Chemicals, Mr. M.S. Gurupadaswamy.

Addressing newsmen at Bangalore on October 21, he said that the present Gulf situation has serious consequences on our economy, besides disrupting the economy of several other countries. The impact will continue to be felt for a longer period even if the crisis is resolved, and the Government might have to retain the Gulf surcharge on petroleum products.

The Minister felt that, as of now, the prices of petroleum products the world over are volatile and may not dip to the pre-crisis level. While justifying the hike in petroleum goods prices and cut in their supply, he observed that the Government did not have any other option left under the circumstances.

The Minister said that he was criticised for resorting to strict measures to conserve fuel by restricting the working hours of petrol pumps all over the country from the last week of June. This has since been relaxed with the hike in petrol price. The measures taken by his Ministry have helped arrest petrol consumption to a greater extent in Karnataka.

He disclosed that the petrol and high-speed diesel (HSD) consumption growth rate during July-September was 2.1% and eight per cent respectively as compared to 16.7% and 9.2% over the corresponding period last year.

The Minister further said that as of now there are 1.73 lakh persons in the waiting list for new LPG connection in Karnataka. The total number of LPG distributors is 222, while eight lakh customers are now being served in the State.

The inadequacy of handling facilities at various ports has affected the import of LPG. The present backlog is 3,014 tonnes, which corresponds to 11 days' backlog for Karnataka alone. Mr. Gurupadaswamy also made an earnest appeal to the Bharatiya Janata Party (BJP) and the Babri Masjid Action Committee members to desist from the path of confrontation and to accept the Centre's three-point formula with a view to resolving the Ram Janmabhoomi-Babri Masjid issue. "Mr. Advani is a well-meaning person. He should therefore, take the situation into consideration. When the country is already facing a multi-dimensional crisis, he should not try to add to the crisis."

The international management training institute proposed by PCL, which has been cleared by his Ministry, will be instituted at Bangalore at an investment cost of Rs. 20 crores. The Joint Secretary of Petrochemicals will be visiting the State Government officials to discuss the project. The new oil installation and Central Institute of Plastic Engineering Technology are being set up at Mysore at a cost of Rs. 11.03 crores and Rs. 12 crores respectively. For the oil installation project IOC has paid Rs. 7.06 crores to the State Government to acquire 26 acres of land. Total tankage is 11,400 kl. The Minister said land for the institute will be made available by the Mysore Urban Development Corporation.

EGYPT CUTS EXPORT OIL PRICES

Egypt cut its export oil prices by \$3 a barrel for all blends, the first reduction after two successive price hikes this month. A senior Oil Ministry official, who requested anonymity, said the new prices are \$34 a barrel for the top quality Khalig el-Zeit and Rasel-Bihar, \$33.15 a barrel for Belayim, \$33 a barrel for Ras Badran. Price changes this month included increases of up to two dollars a barrel.

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HALDIA PROJECT**EIL may be chosen prime consultant**

Impressed by its performance at Hazira, the West Bengal government has made up its mind to select Engineers India Limited (EIL) as the prime Indian consultant for the Haldia Petrochemicals project. The formal selection, however, will be made at the next meeting of the Haldia board. Recently, a high-powered team of the state visited Maharashtra and Gujarat to make an on-the-spot survey of the different petrochemical plants there. They visited, among other sites, the Maharashtra gas cracker plant at Thane, the Patalganga plant of Reliance India Ltd. and the Baroda Petrochemicals. EIL's performance in developing Hazira as a site for petrochemical plants has, however, impressed the team most.

Earlier, a presentation of EIL on how it had developed Hazira according to the programme of Gujarat Industrial Development Corporation (GIDC) had made the West Bengal government to think of remodelling the basic plan for Haldia development. The state government had felt that the way EIL suggested to incorporate the effluent treatment plants for the highly toxic chemical units to come up along with the mother cracker would need readjustment in the Haldia plan. The team, which visited the Hazira site, was also impressed by the manner in which the ancillary and downstream units had been planned by EIL. Mainly on these two grounds the state government thought that EIL had an edge over its competitors.

Another area in which EIL had scored over its competitors had been its suggestions for acquisition of land for the project at Hazira and consequently the way the displaced persons were rehabilitated. This was clearly a problem which was taxing the state government for long. In fact, the state government was having differences with the local CITU leaders on the plans for rehabilitation. EIL's suggestions,

implemented in Hazira, might come in handy for the state government.

Meanwhile, discussions have begun for the selection of foreign collaborators to construct the main naphtha cracker plant among the members of the Haldia board. Eight firms have been shortlisted. Discussions with the financial institutions about the terms and conditions laid down by these firms for selection have been completed. The advanced technology of the three US firms selected in the shortlist has given them an edge over others.

BARAUNI PETROCHEM COMPLEX REMAINS A NON-STARTER

The former Union Minister, Ms. Krishna Sahi, has deplored the delay in setting up the much-awaited petrochemical complex at Barauni oil town. The delay was due to certain political interference even after the Centre issued a letter of intent in 1984-85 and sent a study team in 1988, she said. In 1982, she said, the then Union Minister for Petroleum, Chemicals and Fertilisers, Mr. P. Shivshankar, has assured in Parliament that the Centre was considering the proposal for establishing a caprolactam and xylene-PTA plant. The Union Energy Minister had reiterated the assurance in 1984.

However, the file gathered dust for another four years till 1988 when the Petroleum Ministry formed a study group for going into the viability of setting up plants for production of caprolactam and aromatics at Barauni. The proposal received a setback last year when Mr. J. Vengal Rao, as the then Union Industry Minister, announced the decision to set up the plant elsewhere in the state and not at Barauni. But, she said, in view of the growing discontent among the people over the change of venue of the complex, the then Prime

Minister, Mr. Rajiv Gandhi, told a public meeting at Begusarai that the complex would be set up at Barauni and the Barauni Oil Refinery would be modernised. Rs. 80 crores were then spent over the modernisation programme.

The Centre had also issued a letter of intent to the Bihar government in July 1985 for setting up a caprolactam project as a part of the petrochemical complex. But due to delay by the state govt. in fulfilling the terms of the letter of intent, the validity of the letter had to be extended from time to time and the last extension expired in Jan. 1989. Ms. Sahi then intervened and the letter of intent was modified to pave the way for setting up the project in the private sector.

STRESS ON OIL CONSERVATION

The Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, underlined the need for conservation of oil by avoiding wasteful consumption and losses. The Minister said this while presenting the oil industry safety awards at a function in New Delhi on October 15. Mr. Gurupadaswamy also urged the safety directorate to study the causes of accidents and fires during transportation of petroleum products and ensure that such accidents leading to loss of life and property were eliminated. The Minister also called for immediate gearing up of the receiving facilities and a review of the outmoded facilities in view of the expected increase of the LPG imports by the end of the Eighth Plan.

Mr. Gurupadaswamy said that during the Eighth Plan the demand of petroleum products was expected to grow by 50 per cent. Similarly the utilisation of natural gas was expected to double from the current 9,000 million cubic metres per year. On the investment front too, he said, the requirement would be double the figure of the Seventh Plan. The proposed investment in the Eighth Plan was Rs. 24,000 crores in the oil sector while in the Seventh Plan it was Rs. 16,000 crores.

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Time-bound gas use plan mooted

The Government should come out with a firm time-bound action plan on the use of natural gas in various sectors and help avoid oil imports which have put a tremendous burden on the economy since the Gulf crisis, oil experts in New Delhi said.

A gas use plan for both domestic and industrial users besides the transport sector is more in order than short cuts like reduction in consumption and raising the prices of petroleum products which fuel inflationary pressures, the experts said.

Natural gas, according to a World Bank estimate, the sources said, could help substitute atleast one fourth of the total demand for oil in the country. It could be effectively used in replacing naphtha as feedstock in fertiliser industry, light diesel oil, and fuel oil in power sector, kerosene and LPG in the domestic sector and diesel and petrol in the transportation sector.

Natural gas is not only a more cost economic substitute for liquid petroleum but also an environmentally cleaner fuel, oil experts said adding, emissions due to burning of the liquid hydrocarbons leading to the greenhouse effect are being viewed seriously internationally. In India, natural gas reserves have doubled in the last ten years. Sustained

exploratory efforts have resulted in the discovery of huge gas reserves in Andhra Pradesh, Tripura, Gujarat, Assam and Bombay offshore. Encouraging results have also been obtained in Rajasthan and Tamil Nadu, the experts said.

The balance recoverable reserves of gas in the country on January 1 this year are put at 602 billion cubic metres. As for gas use now, the current level is about 30 million cubic metres per day and it is expected to increase to about 100 million cubic metres per day by the end of Eighth Plan (1994-95) and about 120 million cubic metres per day by 2000 AD.

Oil experts said that though gas utilisation in the country had increased from 58.79 per cent in 1980-81 to over 70 per cent as of now, about 30 per cent of gas was not being utilised inspite of the fact that ONGC enlisted 25 to 30 per cent more consumers than what it was capable of registering.

This gap between production and use, experts said, was due to delay in commissioning of downstream facilities by consumers, less offtake of committed quantities by consumers, lack of transport facilities for dealing with associated gas produced along with crude oil and contractual provisions not demand-

ing the desired discipline on the part of the consumers.

Natural gas as feedstock for fertiliser industry, helped to yield value added industrial products like ammonia, methanol, plastic, polymers and synthetic fibres. Gas is a more preferable fuel for power generation due to lower capital cost, higher conversion efficiency, absence of pollution and lesser lead time and gestation period for gas based power projects than coal based ones.

Oil experts said that there was a need to study more closely the linkages between the various energy sectors and also the cost benefit analysis of taking up the use of gas. A long term gas development plan, say for ten years, should be prepared which would provide the desired thrust and direction towards increasing the utilisation of gas, they said.

For optimal utilisation of gas, it is essential to ensure that it is transported to potential markets over long distances through pipelines. The Trans Siberian pipeline covers a distance of 6,000 kms and supplies gas from western Siberian Tynmen province to western Europe. Similarly the 2100 km line from Hass R'mel Algeria supplies gas to Italy.

Recently Iran had mooted the idea of a 6,000 km long pipeline running from

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its soil through its neighbouring countries down to India to Bangladesh. The concept of a national gas grid mooted by the ONGC, the experts said, assumed significance and government should act on it without further delay. Such a grid would help end regional imbalances, the experts said adding, ONGC had already developed regional grids in Assam and Gujarat. In the gas rich Krishna Godavari onlands a beginning has been made with the completion of a 72 km pipeline connecting Narsapur to Kovvur.

An ambitious plan for a regional gas grid for southern states has already been prepared and it merits a quick decision making, the experts said. A sense of urgency in the decision making process was needed for clearing gas based projects. In western offshore alone, gas worth Rs. 1,000 crores was being flared due to non clearance of schemes, the experts said.

Huge investments made in gas production and transportation sometimes remain locked up due to delay in commissioning of downstream facilities or due to reluctance on the part of consumers to pick up committed quantities of gas. The RCF, Thal, had delayed the picking up of gas by as many as nine months after ONGC was ready to supply. HBJ supply started six months after ONGC was ready and Andhra

Pradesh State Electricity Board committed itself to pick up five lakh cubic metres of gas per day in May 1988 but till date has not begun lifting the gas.

The Tripura State Electricity Board has delayed setting up two gas generator sets at Baramura and as a result is picking up only 60,000 cubic metres of gas per day against its committed quantity of 1,80,000 cubic metres of gas per day. The Assam Electricity Board, according to the experts, has been lifting only 2,19,000 cubic metres of gas per day against its committed offtake of 4,65,000 cubic metres of gas per day.

The Gujarat Electricity Board is taking only one fourth of its committed quantity of five lakh cubic metres of gas per day. The minimum guarantee clause for gas offtake has only disciplined the consumers but has not been very successful. Compressed natural gas could be used as substitute for petrol and diesel in the transportation sector.

USSR, Italy and New Zealand are in the forefront of this technology. In India, the Gujarat Road Transport Corporation is using CNG in motor vehicles in place of diesel and gasoline. Ashok Leyland and TELCO are also involved in this project besides the ONGC, the prime mover. Two passenger buses are running in Ahmedabad city since 1989 with success. ONGC has converted its jeeps

and trucks into CNG vehicles in Agartala and Tripura. It is estimated that if CNG was used on a large scale, there could be a saving of three million tonnes of crude oil every year which need not be imported.

CRUDE PRICE FALLS BY \$5 A BARREL

Crude oil price in the US has fallen by an unprecedented \$5.41 to close at \$28.38 a barrel on reports of calming tensions in the Gulf crisis. This marks the second successive week that the New York Mercantile Exchange has registered a steady fall in the price of West Texaco intermediate crude with the recent decline.

The sell-off was marked by reports quoting Saudi Arabian Defence Minister indicating that the present Gulf crisis resulting from Iraqi invasion of Kuwait could be resolved peacefully and there could be a compromise on Iraq's territorial claims against Kuwait. However the oil price fall did not prove beneficial for the stock market. The Wall Street started the day on a bleak note and during first half of trading the blue chips in the Dow Jones industrial average were down 35 points. But the Dow closed the day with a decline of five points from last week at 2516. Last week it had gained 123 points after losing 112 points the previous week.

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PETRO-FUEL & OIL CUT

Some key sectors spared

The government has decided to exempt several key sectors like coal and industrial units from the petro-fuel and oil cuts announced in June.

While there would be no cuts in supplies of high-speed diesel (HSD) to the coal sector, naphtha would be supplied at full requirement to fertiliser and petrochemical sectors.

The 100 per cent export-oriented units (EOUs) have also been exempted from any cuts in fuel supplies. It has been decided to supply fuel to new units as well, though on the basis of only 60 per cent capacity utilisation. The June announcement had said that the fuel would be supplied on the basis of the preceding three years' withdrawals. This meant that the new units proposed to be set up would not be eligible for fuel supplies.

Similarly, the expanding units would also get the fuel on the same basis. However, units going in for increased production are unlikely to get any concessions. The Petroleum Ministry took a sympathetic view in these cases following several representatives from the units both in the private and public sector. The Ministry found that it was not possible to take a rigid stand on the

fuel cuts which would result in a fall in domestic production and exports. The sick units would also be eligible for fuel supplies. However, the quantity these units would require would need to be certified. The modalities in this regard are being worked out.

The sources point out that in the case of private sector sick units (PSUs), the Board for Industrial & Financial Reconstruction (BIFR) could certify the sick units' fuel requirements, but a decision for sick PSUs would have to be taken by the Ministry concerned. Similarly in the case of units exporting part of their production, the Commerce Ministry will have to help the Petroleum Ministry to certify their fuel requirements.

A meeting of the senior officials of the Finance, Commerce, Industry and Petroleum Ministry is likely to take place soon to finalise the modalities.

It is pointed out that these steps had become inevitable to prevent a fall in industrial and export production which have been registering significant growth rates. While the export growth was put at about 23 per cent in the first quarter, the industrial growth has been around 13 per cent. However, following the June announcement in regard to cuts in

fuel supplies, the government feared that both industrial as well as export activity would register a steep fall.

In regard to the steel sector, it has now been decided not to exempt the same from cuts, though the fuel would be centrally allocated to the Steel Authority of India (SAIL). Hitherto, allocations were made directly to steel plants. SAIL had pointed out that it did not want profit-making plants to suffer on account of these cuts. Hence, in the event of fuel allocation to SAIL it would be able to sustain regular supplies to profit-making plants like Bokaro at the cost of loss-making plants.

STRESS ON USE OF GAS FOR VEHICLES

The government has already taken a policy decision to utilise natural gas for transport sector as an alternative to petrol and diesel and experiments conducted in Gujarat and other places proved that vehicles could be run on gas successfully and more economically. The General Manager, Oil and Natural Gas Commission (ONGC), Mr. Rao, said that using gas in place of diesel itself proved cheaper. Therefore, it would be even more economical in replacing petrol. He said the trial run of vehicles with natural gas was carried out by Gujarat State Road Transport Corporation and ONGC also.

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HOPES OF MAJOR FIND DASHED

Foreign oil companies draw blank

Bad news does not come single. While the Indian economy has been thrown out of gear in the wake of the Gulf crisis and the resulting spurt in oil prices in the global market, the country's hopes to strike a major oil find have been dashed with all the five foreign oil companies hunting for oil on the west and east coast under the third round of bidding, drawing a blank.

One of the companies, Chevron Texaco has withdrawn from all the three blocks in the Krishna-Godavari and Palar offshore on the east coast of India after completion of their first phase of exploration.

Another company, Amoco, which had taken up a block in the Krishna-Godavari offshore is still negotiating with Sonat drilling company, Singapore for undertaking this job for it.

This company had earlier completed the interpretation and evaluation of geological and geophysical data at its office in Houston. It proposes to hold a meeting by the end of the month to present its interpretation report.

Shell of the Netherlands has taken up two blocks in the Kerala-Konkan offshore. It has already relinquished its interest in one of the blocks and has expressed its desire to withdraw from the second block also after having failed in the locating a participating partner in the exploratory activities on the west coast.

According to official sources, International Petroleum Limited (IPL) has to drill an obligatory well before mid-December. The Government had earlier rejected the request for the assignment of its full interest to its subsidiary, International Petroleum (India) Ltd.

The company, the sources say, has

now moved a fresh proposal to the Ministry of Petroleum and Chemicals to assign 50 per cent of its interest in the Krishna-Godavari offshore to Hardy Oil Gas (UK) Ltd.

The decision from the Ministry of Petroleum and Chemicals is awaited.

The fifth company BHPP, Australia has signed a contract for the Kerala-Konkan offshore. The company has drilled one well.

The evaluation of the drilling results of BHPP is nearing completion and the company is to present shortly the analysis of the drilling results.

The country has so far witnessed three rounds of bidding for exploration without witnessing any tangible results. Prior to these three rounds, at least three foreign oil companies have worked in India with negative results during the mid-seventies.

On the east coast, the Asamer group operating in the Cauvery basin and the Carberg Natomas group in the Bengal basin wound up their operations without achieving any success. On the west coast, success also eluded Reading and Bates operating in the Kutch basin in 1975-76.

In the first round of bidding in 1979, 32 blocks were offered (15 onshore and 17 offshore) of which two blocks in offshore Saurashtra were taken by Chevron Oil of the US.

The company drilled three wells which proved to be dry, and spent about \$ 30 million.

In the second round of bidding in 1982, 50 blocks were offered (eight onshore and 42 offshore). However, no contract was signed with any company.

In the third round in 1986, 27 blocks were offered (all offshore) out of which contracts were signed with five companies for a total of nine blocks (eight blocks of ONGC and one block of OIL covering an area of 119,960 sq. km).

The five companies are Chevron Texaco (US), International Petroleum Ltd. (Dubai), BHP Petroleum (Australia), Shell (the Netherlands) and Amoco (US). These companies have together drilled five till the end of 1989-90 and spent a total of about \$ 51 million in the eight blocks of Oil and Natural Gas Commission.

For the fourth round of bidding, the Union Government had set up a committee headed by Mr. Lovraj Kumar. The committee identified 62 blocks (25 onshore and 33 offshore) for inviting bids.

HFCL TO CLOSE MARKETING OFFICES IN MP

In a bid to cut down on the mounting losses, the Hindustan Fertilizer Corporation Ltd. (HFCL) has lately decided to close down its marketing offices in the Madhya Pradesh region on the plea that they were not getting the necessary support from the Union government.

This decision of HFCL would result in the closure of offices at Raipur, Jabalpur and Bhopal and would make around 50 persons surplus. Terming the management's decision as "arbitrary", the employees' association said that these offices were functioning since 1968 and were doing a commendable job in the backward area of Chhattisgarh.

The association further blamed the management to be inefficient and demanded that the decision be revoked.

They opined that the offices could be made viable after the availability of fertilizers.

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UK aid likely for coal project

The Pootkee Balihari project of the Bharat Coking Coal (BCCL) the capacity of which has been scaled down to 1.6 million tonnes per annum might now be included in the list of Indo-British collaborations in the coal sector. This follows the World Bank's opting out of the project on the grounds that it was not viable according to sources in Coal India Ltd., the holding company for the nationalised coal industry. A loan amount of US \$ 248 was earmarked for the project which had an earlier capacity of three million tonnes.

However, CIL is keen to go ahead with the underground mining project even if it is an unviable one as the mine would yield valuable and scarce prime coking coal. At present, the bulk of coking coal is imported as the indigenous supply is not sufficient to meet demand. The Pootkee Balihari project, which was approved by the Union Government in 1983 with linkage to steel plants, is located in the Dhanbad district of Bihar.

The earlier project schedule which was scheduled for completion in March, 1994 got upset primarily due to delays in shaft sinking and land acquisition. It is now scheduled for completion in December, 1995. Currently the project for which the revised project report is under consideration is included under Indo-Polish collaboration. The Polish technical assistance has been sought for sinking of shaft in the project. The British Mining Consultants, an agency appointed by CIL to have a fresh look at the viability aspect has come up with two to three alternative projections of capacity and technology.

One of the technologies being suggested by them is one long wall face and mechanised board and pillar in place of the earlier suggestion of having three long wall faces for a three million tonnes per annum capacity. While things are still in a preliminary stage, they are all the same expected to have

figured during the talks held by the Indian delegation during their visit to the UK recently.

The delegation was led by the Joint Secretary in the Department of Coal, Mr. S. Bandyopadhyay, and comprised at least 20 members. The CIL Chairman, Mr. M.P. Narayanan was also in the delegation. The sources said that during the visit the issues which were discussed included on going projects and their funding supply of equipment along with their spares.

At present the Amlori project under the Northern Coalfields Ltd. (NCL) which has a capacity of producing 4 million tonnes of coal once it is completed in 1991-92 is included under Indo-British collaboration for the supply of equipment. The British would also be helping in improvement of the environment management plan for this project improving on the plan made by the Central Mine Planning and Design Institute (CMPDI). In 1987, the UK side granted to India a tied grant of 31 million pound sterling for the Indian coal sector mainly to cover costs of longwall sets supply. A part of it was agreed to be used for import of spares for draglines longwall sets, road headers and for other small value imports.

TOP INDIAN COAL EXECUTIVES SEE MINING TECHNOLOGY IN BRITAIN

Twenty Indian Government and coal industry administrators have returned home from a successful 10-day visit to the United Kingdom where they strengthened relations with British mining equipment manufacturers and saw some of their latest technology. The Indians' stay from 15 to 24 September was sponsored by the Association of British Mining Equipment Companies (ABMEC) and organised in association with Britain's Department of Trade and Industry. The group was led by Somnath Bandopadhyay, Joint Secretary in

the Ministry of Energy, Department of Coal. Expressing satisfaction at the outcome of the mission at a farewell dinner hosted by ABMEC in London, Mr. Bandopadhyay spoke of a deeper rapport with British mining equipment experts and emphasised the need for further interaction between mining interests in both countries. As part of this process, he invited British coal producers to extend their contacts in India's industrial sector.

Collaborative ventures

During their tour, the visitors went to some British Coal Corporation mines to see examples of highly mechanised operations using longwall mining techniques to achieve maximum production. After seeing equipment in use and being manufactured in the factory, they had discussions on mine planning with British Coal and British mining consultants. India has long-standing links with Britain in collaborative ventures aimed at meeting increasing coal production targets. British suppliers have been to the fore in introducing longwall mining equipment to India over the past 10 years and the Overseas Development Administration (ODA) has funded the foreign exchange cost of most installations. The ODA is supporting a programme of technical assistance and training for Indian coal mining personnel involving British organisations and consultants. Talks on equipment and technological issues took place when the mission visited British companies concerned with the Indian mining industry.

Technology transfers

These included Gullick Dobson and Meco Mining, both manufacturers of mechanised roof supports, and Dosco Mining, which makes roadheaders. Under an agreement with Gullick Dobson, the Calcutta-based Jessops manufactures Gullick-designed products under licence. Dosco Mining, Meco Mining and Anderson Longwall, makers of shearers, have similar technology transfer arrangements with the Mining & Allied Mach. Corp.

INTERNATIONAL PRICES PLUNGE

Chrome ore exports may suffer

Sharp fall in international prices and the uncertainty about government policies are expected to hit chrome ore exports from the country. According to informed sources, questions have been raised by international buyers about India being a dependable supplier of chrome ore following a communication by the Orissa government in April this year that a ban on chrome ore exports is being considered.

The stand of the state government has subsequently undergone a change, with the chief minister, Mr. Biju Patnaik, not only advocating exports but complaining that the Minerals and Metals Trading Corporation of India (MMTC) has discriminated against the state-owned Orissa Mining Corporation (OMC) and favoured the private sector Tata Iron and Steel Company (TISCO) in the allocation of export quota.

OMC had claimed that against exports of 50,000 tonnes by TISCO, OMC had managed to export only 15,000 tonnes of chrome ore. In a later development, however, the OMC had been able to get its own export quota hiked to 47,000 tonnes till the end of October. Besides OMC and TISCO, the one other exporter from Orissa is Misrilal Mines Pvt. Ltd., Mysore Minerals

Ltd., is the fourth exporter, is based in Karnataka.

In all, the total export quota for chrome ore this year is 2.50 lakh tonnes. Due to adverse demand situation in the international markets, the price of chrome ore has fallen from 80 US cents per pound last year to only around 47 cents currently. As a result, buyers have been able to dictate terms to the sellers. According to MMTC sources, OMC's claim that TISCO was favoured by provision of higher export quotas is not correct. It is the international buyer who have shown a marked preference for TISCO, the marketing support provided by Tata London had come in handy. Reportedly, given a buyer's market, MMTC is not in a position to tell the purchaser that he should prefer OMC ore instead of that of TISCO's.

In any case, MMTC claims that OMC indicated its willingness to sell ore only in June this year, by which time TISCO had already struck some deals. It is also claimed that the international preference for TISCO ore is due to its better quality. But this is disputed by OMC. The OMC-TISCO controversy has arisen essentially for two reasons. Firstly, because of the falling price of chrome ore, which has turned the inter-

national market to a buyers market. Secondly, as a result of crash in price and demand, it is felt that India may not be able to export the entire allocated quota of 2.5 lakh tonnes. These factors had lead to competition between the two big suppliers.

Given the international situation, the Union government must follow a logical policy on chrome ore exports. Besides ensuring proper coordination among the exporting agencies, should avoid sending the wrong signals to large international buyers. Besides India, the other exporters in the world are South Africa, Turkey, Soviet Union, Albania and Botswana. Among the main customers are China and Japan. The total value of Indian exports is placed at around Rs. 65 crores.

Rs. 18.6 CRORE DIVIDEND FROM IPCL

The chairman and managing director of Indian Petrochemicals Corporation Ltd. (IPCL), Mr. Hasmukh Shah, presented a cheque of Rs. 18.6 crore to the Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, as dividend to the government for 1989-90. IPCL achieved a turnover of Rs. 1,178 crore and earned a gross profit of Rs. 217 crore during 1989-90. There was all-round improvement in the company's performance during the year.

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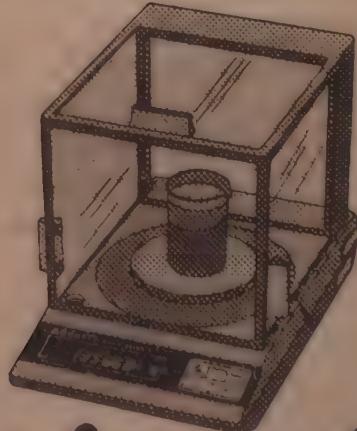
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MINERALS' EXPLORATION ABROAD**India achieves breakthrough**

exploration of tungsten.

India's efforts to take up exploration activities in foreign countries has finally met with success. The French giant BRGM, which had recently bagged an order to explore base metal mines in Kenya has agreed to associate India for the job.

According to the mining secretary, Mr. P.K. Lahiri, the Indian public sector, Mineral Exploration Corporation Limited (MECL), will work in collaboration with BRGM for exploration activities in Kenya. MECL had earlier made an effort to take up exploratory work in Jordan which met with failure.

Though India would be involved in a small way in Kenya, it has finally achieved a breakthrough. According to Mr. Lahiri there is a likelihood of India taking up the exploration activities in the Phillipines as well in collaboration with BRGM again. BRGM has agreed in principle to involve India in a "big way" in the Phillipines venture provided they bag the contract.

India's participation would be mainly through transfer of skilled personnel. BRGM has been in fact lending a helpful hand to India in the latter's domestic mining works as well. Mr. Lahiri's recent Paris visit had been very fruitful. The two countries shortlisted three ventures to be taken up for exploration by BRGM in India in the tungsten and tin sector. Earlier five ventures were identified of which France rejected two for exploration after the stage one. (Stage one involved collection of data by the Indian authorities for consideration by BRGM).

According to Mr. Lahiri the exploration on the first venture would begin by end of this month on Burugubanda-Tapaskonda belt in Andhra Pradesh. The exploration for second would begin in January, 1991 in Khobna in Maharashtra. Both these ventures are for

The third and final exploratory work would be done in Torhan in Haryana for tin. The work here is expected to begin by June 1991. According to a report prepared by the Geological Survey of India (GSI) in collaboration with MECL, in all the three areas marginal deposits of tin and tungsten exist. The two which were rejected had very low deposit content.

According to the mining secretary it has been decided to involve BRGM in exploratory work for gold, diamond and copper mining as well. There are at present only two major diamond fields — one in Panna and another in Andhra Pradesh. While there is no help required for Panna, the Krishna river beds in AP need to be explored. Similarly, in gold the extensions of Kolar-schist belt would be explored in consultation with BRGM.

About three belts i.e., one each in Bihar, Rajasthan and Madhya Pradesh, would be explored for copper in consultation with BRGM. For all these exploratory activities to be undertaken with BRGM India has sought a grant of about 20 million French Francs. Mr. Lahiri said that if it comes through this would be the first time the department of mines would be getting the special line of credit from France. Hitherto, a small part of the total French grant was earmarked for mining sector.

The French industry ministry has agreed in principle which is yet to be cleared by their ministry of finance.

35 P.C. RISE IN INSTRUMENTS DEMAND LIKELY

Demand for instruments during the 8th Plan is expected to be 30-35 per cent higher than that of 7th Plan period, according to Mr. C.P. Sood, President,

All India Instrument Manufacturers and Dealers Association. Mr. Sood told the 34th annual general meeting of the Association to meet the demand, the indigenous manufacturing activity had to be promoted and imports curtailed to the minimum. There was also need for raising export.

Mr. Sood stated that IMDA proposed to discuss with concerned Government departments, the possibilities of creation of a comprehensive data bank which would forecast demand and technological trends and provide all concerned with accurate inputs for decision-making.

Mr. P.Goswamy, Hon. Secretary, stated that the world over, technological changes in the instrument sector were taking place at a faster pace. He said that IMDA has brought to the attention of the concerned Government departments, the anomalies in the customs duty on components vis-a-vis complete instruments, which was one of the major problems.

While the imported components attracted a much higher duty ranging between 80 per cent and 145 per cent, the duty applicable on instruments varies between 35 per cent and 65 per cent. This disparity of high customs duty on components encouraged imports rather than indigenous manufacture.

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BIS role in ecology protection

India is celebrating the World Standards Day this year along with other countries. The Bureau of Indian Standards (BIS) is organising seminars, lectures, get-togethers and exhibitions to focus attention on the importance of standards and standardisation in the context of developing the industrial economy of the country.

The celebrations will be organised at the headquarters and various regional and branch offices. The theme for discussion for this year's standards day is 'environment protection through standards'.

The standardisation community the world over is addressing itself to the challenge with the urgency it demands. While celebrating the World Standards Day, the foundation day of the International Organisation for Standardisation (ISO) has been decided to earmark "standards for environment" as the theme for the year.

Mr. Richard E. Brett, President of IEC and Mr. Roy A. Phillips, President of ISO, in their joint world standards day message recently said that standardisation provides an effective tool to find a solution to the technical problems that bear on environment. Without standard testing methods, the environmental map of the world would be chequered with contradictions".

According to a press note issued by BIS, the institute has been able to recognise this problem in the early sixties when it initiated work on water pollution as it was the prime requisite for domestic as well as industrial activity. Work in the field of air pollution was taken in hand in the early sixties and for solid waste management and noise pollution problems in the same period.

Till date more than 200 standards have been formulated by BIS which have helped in environment protection. In addition, standards are also available

on a number of allied aspects like estimation of the volume of water flowing in water courses, requirements of water supply and sanitation, detection of pesticidal residues and handling of cases of pesticidal poisoning.

Initially, standardisation activity was confined to fixing standards on characteristics of emissions and effluents, developments of codes of practice for treatment of effluents and test methods for determining concentration of various pollutants in the liquid and gaseous wastes. BIS is now taking up new areas like environment impact assessment and managerial aspects of pollution, according to the release.

The formulation of standards in this vital area is being supervised primarily by the technical committee for environment protection which functions under the aegis of the chemical division council. Some other committees which also have a bearing on this field are sectional committees on chemical hazards, nuclear materials, radio communications, functional requirement, reservoirs and pesticides residue analysis.

For an appraisal of the situation and plan strategies for the future. BIS had organised a seminar on "environmental protection through standards". The participants in this seminar included experts from apex bodies like Central Pollution Control Board, Forest Research Institute, National Wasteland Development Board and Tata Energy Research Institute.

JAPAN PLANS TO STABILISE CO₂ EMISSIONS

Japan plans to stabilise emissions of carbon dioxide, believed to be a major cause of global warming, at present levels by the year 2000, the Government said.

"The government has agreed in principle to stabilise emissions at the 1990

level, although there has not yet been a formal decision", said Mr. Kazuo Matsushita, Director of the office of Overseas Environmental Cooperation at the Environmental Agency (EA). Japan produced 4.7 per cent of world emissions of carbon dioxide in 1987, the fourth largest in the world. Japan's target was announced ahead of the second world climate conference, scheduled for Geneva from October 29 to November 7.

The United States has not said it will stabilise emissions but Germany has proposed cutting its present emissions by 25 per cent by the year 2005. "Japan wants to have an international impact", Mr. Matsushita said. "Japan should apply pressure on the US at the Geneva conference."

GLOBAL FUNDING FOR ENVIRONMENT SUGGESTED

The Environment Minister Nilamani Routray asked for international funding and technology transfer to third world countries to help tackle environment problems.

Delivering the keynote address to the ministers' level conference on environment and development organised by Economic and Social Commission for Asia and the Pacific (ESCAP) at Bangkok, Mr. Routray said, the Montreal protocol and subsequent negotiations were a pointer to the direction in which international interaction on global environment was moving. Mr. Routray, is leading the Indian delegation to the conference which is being attended by 45 countries from Asia and the Pacific. Expressing his concern about the fast degrading environment, Mr. Routray urged the developed countries to curb consumerism and overexploitation of natural resources. "Unless we are in a position to bridge the widening gap between the 'haves' and 'have-nots', the talk of sustainable development will remain as a cosmetic and utopian concept.

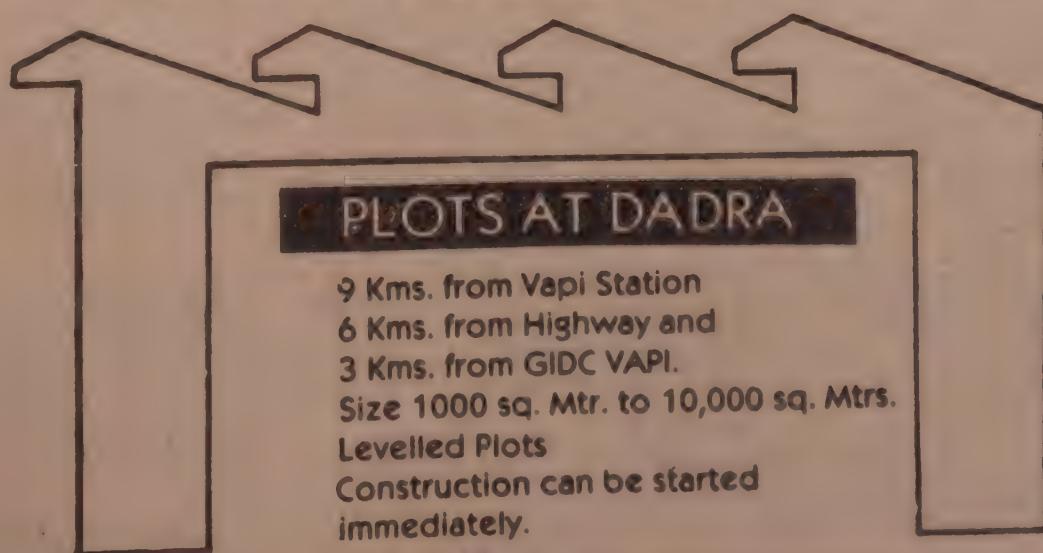
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Consumer goods to be certified as 'environment-friendly'

Consumer goods manufacturers may soon have to redefine their marketing strategies as customers will now have the option to reject products that pollute the environment and pose health hazards.

Instead, they can opt for products which have an official label certifying that they are less harmful and have a more benign impact on the environment.

The government is launching a scheme to give environment-friendly products (EFP) a special label similar to the ISI mark, hoping that customers would prefer these items and induce companies to suitably modify their manufacturing processes.

India will be the first developing country to introduce such a scheme. At present, the trend is confined to the US, Canada, Japan and European countries, where it has been a success.

In Germany, customers showed a marked preference for household paints carrying the Blue Angel symbol. This has reduced the amount of organic solvents entering the waste stream by 40,000 tonnes.

In the United Kingdom, several companies have launched advertising campaigns themselves stressing the environmental benefits of their products.

Products like low mercury ranged batteries and chlorine-free nappies are becoming popular to the extent that producers are concerned about the proliferation of official labels.

The products likely to be covered by the scheme in India include plastics, soaps and detergents, aerosols, paper, pesticides, fertilisers, textiles, drugs, preservatives, cosmetics, electronic goods, paints, rubber, lubricating oils, batteries, packaging and beverages. The

environment ministry proposes to constitute a technical panel in the Central Pollution Control Board to advice and recommend producer categories and evolve detailed criteria to award the environment friendly mark.

To get an EFP logo on a product a manufacturer will have to approach the Bureau of Indian Standards, which will have the overall authority to administer and implement this scheme.

The BIS will assess the product for its possible adverse impact on the environment and evaluate it in light of the notified criteria. After the product has been designated EFP, the BIS shall continue to monitor it and can withdraw the logo if it does not meet the standards.

Before finalising the scheme, the ministry will consider comments and suggestions from environmentalists and industry.

It has approached the apex chambers of commerce and industry and invited suggestions regarding its merits, whether it should be voluntary, which products should be covered, the organisational set-up, and the assessment criteria.

Already, opinion is divided on whether the assessment should encompass all aspects of a product like cycle from production through use or disposal, or whether it should focus more narrowly on the impact in use by the consumer, or on use and disposal.

The ministry feels that a cradle-to-grave assessment would be more accurate and comprehensive but would take longer to complete an environmental audit of a factory.

It favours a comparatively simpler system, in which the criteria for awarding a label should not forego the quality

of the products and should focus primarily on the direct impact of a product during use and disposal.

Other aspects such as energy efficiency and noise in electric goods, including the effect of the manufacturing process and reduced waste production at source would also be considered by the ministry.

MPCB MEET TO DECIDE ON TEC PROJECT

Maharashtra Pollution Control Board (MPCB) will hold a meeting at Bombay on October 30 to consider clearance for Tata Electric Companies (TEC) proposed 180-megawatt (MW) gas turbine generating station at Trombay to provide power to essential services in case of a major power breakdown in Bombay.

Meanwhile, the technical committee of MPCB held a meeting on October 1 to consider TEC's proposal. A limit of 15 tonnes emission of nitrogen oxide and sulphur dioxide and other particulated matter to be emitted per day by the plant was favoured, according to sources in MPCB.

The committee held the view that TEC should undertake afforestation of area round the plant, and continuously monitor pollution.

MPCB has urged the TEC to get 2.5 million cubic metres per day (MMCMD) of gas per day for the unit from the existing level of 1.5 million cubic metres per day.

The board has felt that 2.5 MMCMD will be more clear fuel.

Following the major power breakdown in 1987, 1988, and 1989, the State Government had set up two panels of experts.

They recommended setting up of TEC's proposed power unit.

Fuel-substitutes to tackle oil crisis

The recent crisis has focused attention on the fact that fossil fuels, especially oil and natural gas, are finite in nature and there is need to explore the possibilities of using other sources of energy.

Extensive research and development work is underway in many countries to find better ways of using bio-mass trees, crops, water plants and agricultural wastes for fuels. According to scientists, woods and agricultural wastes can be turned into alcohols, methanol or ethanol. While methanol is produced from wood, ethanol is produced from grains like corn and even sugarcane. However, alcohols have lower heat value than gasoline. Methanol has only 49 per cent and ethanol 66 per cent of the heat content of a comparable amount of gasoline.

Some crops that contain sugar and starches can be turned directly into ethanol. Sugarcane and sweet sorghum (jowar) are such crops. Ethanol can either be used as a fuel on its own or blended with gasoline. According to some studies, internal combustion engines need some modifications if fuelled entirely by ethanol. No other changes are needed at all. However, if up to 20 per cent of ethanol is mixed with gasoline, the ethanol increases the octane rating of the fuel and so elimi-

nates the use of lead additives, which are suspected to cause pollution.

Today, many countries in the world are experimenting with alcohol fuels. In Brazil over 90 per cent of the passenger and light vans are run purely on alcohol. Cassava (Mandioca) — a subsistence crop in many developing countries — is a primary starch crop, which has many advantages. About 10 to 12 tonnes of cassava can be produced per hectare each year and this can be converted into about 2,160 litres of alcohol. Plants like corn, rice and other cereals can be turned into ethanol.

In the United States, about six tonnes of corn is produced annually per hectare to yield about 2,000 litres of alcohol. Soybeans, sunflowers and ground nuts also can be used to fuel diesel engines without much processing. Most of these plants can be grown in a wide range of soils.

In a pioneering development, scientists at the Nimkar Agricultural Research Institute, Phaltan, Maharashtra have produced industrial alcohol from sweet sorghum. The scheme for alcohol production from sorghum has the potential to replace kerosene for cooking and lighting. India imports about Rs. 1,500 crore worth of kerosene every year. Scientists have also developed lanterns and

stoves, which run on alcohol

There are plants known as petrocrops that yield petroleum-like hydrocarbons and contain a number of chemical constituents which can substitute for petroleum and petroleum-based products. Extensive surveys in Andhra Pradesh have shown that petrocrops are abundantly available in Ranga Reddy, Nalgonda, Vishakapatnam, Anantapur, Krishna and Guntur districts.

Similarly, a number of late-yielding plants are seen in Alwar, Jodhpur and Udaipur in Rajasthan. One such extremely promising plants is jojoba. Studies at the Indian Institute of Petroleum (IIP), Dehradun show that the sulphurised jojoba oil is very much similar to petroleum. Cassava is emerging as another potential source of alcohol.

Latex from euphorbia (species of rubber plants) has the potential to substitute for petro products. Studies at the Shri Ram Institute for Industrial Research in New Delhi have shown that latex can be used for making emulsion paint which is a petroleum-based product.

Water hyacinth, one of the most troublesome weeds in the world, appears to be another viable proposition for assuaging the world energy crisis. It has tremendous capacity to grow and

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regenerate. Even a small piece of the plant can produce a full crop and double itself within eight to 10 days.

The Central Mechanical Engineering Research Institute, Durgapur has designed a continuous feed plant for generating combustible gases from water hyacinth. Similar studies are in progress at Hau, Hissar, IIT Madras and the Regional Research Laboratory, Jorhat.

The Central Institute of Fisheries Technology (CIFT), Cochin, has developed a cooking gas from water hyacinth, which can be used as a substitute for LPG. According to Dr. D.P. Chakraborty of CIFT, who developed the process, 10 kg of the aquatic weed can generate half a kg of gas which will not only meet a day's cooking requirements for a family of five, but also keep a petromax burning for a few hours at night.

Dangerous weeds have also been tried for fuel. Latana is a wild weed grown in parts of Punjab, Rajasthan, Uttar Pradesh and Bihar. Latana on pyrolysis yields very good charcoal with a heating value of 6211 kcal/kg. There are a large number of other weeds which can be used for fuel production.

The need for renewable sources of energy, particularly in view of the depleting oil and coal resources, once again

brought wood gasifiers into focus. If gasifiers could be designed properly and in a cost-effective manner, consumption of diesel could be reduced greatly. A large number of diesel in agricultural pumpsets and other devices could make use of gasifiers alongwith engines.

The Indian Institute of Science (IISc), Bangalore, has demonstrated the technical feasibility of wood gas generator, running a diesel pumpset with a power rating of five horse power. According to the Department of Non-conventional Energy Sources (DNES), nearly 400 gasifiers of five horse power have been installed in the country.

Scientists at the Indian Institute of Technology (IIT) in New Delhi have developed a gasifier that uses agricultural and forest wastes. The IIT's gasifiers will also provide portable power for agricultural operations. According to experts, if all the available organic matter in city refuse in India is converted into biogas, the heat energy made available can satisfy 27 per cent of the domestic energy requirements of the Indian population.

NEW FURNACES OFFER 65 PER CENT FUEL SAVINGS

Two engineers who developed new compact rapid-heating gas furnaces that use up to 65 per cent less fuel than

normal have won this year's U.K. Royal Society Esso Energy Award. The award, given annually for the outstanding contribution to the conservation of energy resources, recognises the achievement of British Gas Engineers, Kevin Ponfret and John Waddington, in producing metal reheating furnaces that have already saved an estimated total of more than 18 million therms of gas since the first commercial installation. More than 300 of these furnaces have been sold.

Before the development of the rapid heating technique, the design of fuel-fired furnaces for reheating stock in metal heating had changed very little for 100 years or so. Traditional furnaces are large box-like structures lined with refractory materials. They operate by firing a stream of hot gases into the chamber, raising the temperature up to 1,350°C and heating the steel by radiation.

The introduction of the rapid heater has brought considerable benefits. Instead of wasting heat in large furnace chambers, the new compact units have achieved fuel savings of up to 65 per cent. Both capital and running costs have been considerably reduced. Startup time takes minutes rather than hours and the sensitive responses to changes in heat input provide a more efficient control of the working temperature and produce a better quality of metal.

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MSFC to enhance limits for assistance

The Maharashtra State Finance Corporation (MSFC) has decided to enhance the outer limit of financial assistance to Rs. 90 lakhs from Rs. 60 lakhs, its Chairman, Mr. M.J. Pherwani, said.

Speaking to newsmen, Mr. Pherwani said MSFC board at its meeting recently decided to launch a scheme of financial assistance of up to Rs. 50,000 to physically handicapped and educated unemployed persons in the age group of 18-40 years and having an annual income of Rs. 6,000 or less.

The beneficiary under this scheme would not be required to bring in any margin money. In addition, the social welfare department would provide 20 per cent of the investment as seed money if the project cost is Rs. 25,000 or below.

Another new scheme launched, he said, was to assist transport operators to purchase trucks and buses. Corporate bodies could recommend transport operators, seeking finance to purchase vehicles to transport the company's materials or workers, by taking the responsibility of repayment.

In such cases a loan of 75 per cent of the cost of the chassis at 16 per cent interest, repayable in three years would

be sanctioned.

Mr. Pherwani and MSFC Managing Director, Mr. Y.S. Bhave, said the corporation, during the last 28 years of its existence, had played a vital role in the industrialisation of the backward districts of Vidarbha region. In the region, the corporation had sanctioned loans to more than 7,000 industrial units of about Rs. 100 crores, they claimed.

It had disbursed loans exceeding Rs. 600 crores during this period in Maharashtra and Goa and had catalysed aggregate investment of Rs. 2000 crores, resulting in employment to one million persons, they said. In future, the focus of MSFC would be on technology upgradation and financing of self-employed professionals, including allopathic, ayurvedic and homeopathic doctors. A special scheme for promoting the talents and entrepreneurial skills of women 'Mahila Udyam Nidhi' had also been launched.

CDC LOOKING FOR FURTHER INVESTMENT

Mr. John Eccles, General Manager of the Commonwealth Development Corporation (CDC) of the United Kingdom was recently in New Delhi, to review current CDC activities in India and to discuss possible future investments. He

met senior Indian Government representatives, officials of financial institutions and businessmen. CDC is a British public corporation committed to promoting economic growth in developing countries. With investments and commitment totalling £1.1 billion in more than 270 projects, CDC is making a significant contribution to economic growth in the private and public sectors in over 50 countries both within and outside the Commonwealth.

CDC IN INDIA

CDC started operations in India in 1987 and opened an office in Delhi in 1988. It has so far committed equivalent of some Rs. 176 crore in equity and loan investment to 10 projects in India. There are lines of credit to Industrial Credit and Investment Corporation of India Ltd. (ICICI) and the Shipping Credit and Investment Corporation of India Ltd. (SCICI); and equity and loan investments to Andhra Petrochemicals Ltd., Apollo Tyres Ltd., Asian Coffee Ltd., Biax Packaging Ltd., Creditcapital Venture Fund (India) Ltd., Modi Threads Ltd., Rane Power Steering Ltd. and Sakthi Soyas Ltd. A number of further projects are currently being considered. For further information, contact Mr. Christopher Stephenson, Regional Controller in India, Commonwealth Development Corp. Vijaya Bldg. 3rd floor, 17, Barakhamba Road, N. Delhi-110 001.

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BEEFING UP EOUS

Enhanced CCS soon

In a move to beef up the performance of 100 per cent export oriented units (EOUs) and free trade zones (FTZs), the Commerce Ministry proposes to offer enhanced benefits in the cash compensatory support (CCS) scheme and value addition.

The Ministry's proposals, pending before the committee secretaries (COS), are expected to be cleared shortly. Subsequently, they would be sent to the Cabinet Committee on Economic Affairs. The Commerce Minister, Mr. Arun Nehru has already informed the EOU and FTZ representatives that the new scheme would be implemented within a month.

According to the official sources, the new scheme would arrest the waning interest of units engaged in the EOUs and FTZs. Further it would provide life support systems to units experiencing high premature death rate in the FTZs.

The Ministry has underscored the need to provide 100 per cent CCS to units in the EOUs and FTZs as against the existing provision of 50 per cent.

In fact, the CCS, which was introduced nearly two years ago following protests from the units in EOUs and FTZs about the non-provision of this facility, has not particularly boosted the entry as well as performance of units in the EOUs and FTZs.

Similarly, considerable changes are proposed to be made in the value-addition criterion. Though the existing scheme of FTZs enjoins value addition in the net foreign exchange to the tune of nearly 34 per cent of the units, in the case of EOUs it is determined on the basis of cost.

Also, the proposed scheme for revamping EOUs and FTZs is expected to rationalise the licensing procedures

of EOUs. Unlike FTZ, the existing EOU decision making structure is highly centralised.

In a way the existing arrangement has failed to provide a proper monitoring and assessment network for the functioning of EOUs, sources argued. Therefore the EOU licensing unit will be reverted to the Commerce Ministry with its officials manning both licensing and monitoring cells.

Interestingly, the contribution of six FTZs to exports and employment has been dismal since its inception. The six zones have so far contributed only about 2.5% to Indian exports while providing less than a quarter per cent of total employment in the manufacturing sector.

More importantly, the value addition in the net foreign exchange by the units in FTZs has been unimpressive and doubts are being expressed about "the efficiency and effectiveness of these enclaves in promoting employment, fostering technological capabilities, defusing these in the domestic economy and more importantly earning foreign exchange".

With the progressive deterioration in the performance of units in six FTZs, it may be recalled that the Comptroller General has come down heavily 'on the inbuilt inertia of these privileged enclaves'. Some analysts of FTZs suggested that foreign investment be laid down as a precondition for setting up units in EPZs.

WORLD DEMAND FOR RUBBER TO RISE

Natural rubber is expected to ride out the Gulf crisis. With the automobile industry hard-hit by the hike in petrol prices, its ancillary the tyre industry has followed suit and taken a beating.

However, the natural rubber producers, who normally depend on the tyre manufacturers for survival have found alternative sources of demand. In fact market observers expect global demand to rise by 2.6 per cent to touch 5.47 million tonnes this year.

The primary reason for this is the increase in offtake of natural rubber by the American army, now stationed in the Gulf. It is expected that demand from this quarter alone will go up by 500 tonnes, this year.

Also, the synthetic rubber manufacturers face a bleak future being heavily dependent on petrochemicals.

This shortage and increased cost of synthetic rubber, it is expected, will further boost the demand for natural rubber.

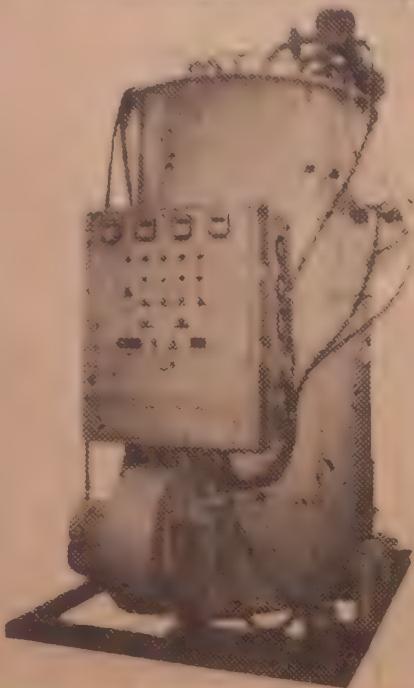
PAINTEX CHEMICALS

Paintex Chemicals (Bombay) Ltd. is embarking upon a Rs. 355 lakh expansion programme to raise its capacity of thinners, industrial solvents, petroleum ethers and esters, namely ethyl acetate and N-butyl acetate from the present level of 1,010 tonnes to 2,700 tonnes at a cost of Rs. 355 lakhs, according to Mr. Rajendra V. Shah, Chairman of the company.

The management had decided to float a public issue to the tune of Rs. 195 lakhs to partly finance the expansion. Petroleum ether production will be raised from the present 210 tonnes to 375 tonnes, thinners from 112.5 tonnes to 1,125 tonnes, industrial solvents from 200 tonnes to 450 tonnes, ethyl acetate from 200 tonnes to 350 tonnes and butyl acetate from 200 tonnes to 400 tonnes.

Means of project financing will be through promoters' equity of Rs. 130 lakhs, public issue of Rs. 195 lakhs, term loan of Rs. 17 lakhs and internal accruals of Rs. 35 lakhs.

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Food & Pharmaceutical Technology in Perspective (Part 2)

STERIFIED PROPOXYLATED LYCEROLS (EPG) A NEW SYNTHETIC FAT SUBSTITUTE

Fat like substances which are resistant to hydrolysis by digestive enzymes comprise a major category of materials under study for partial or complete replacements for fats and oils. Esterified propoxylated glycerols (EPG) are a new family of propylene oxide derivatives developed by ARCO Chemical Company 3801, West Chester Pike, Newtown Square, Pa. USA.

The structure of EPG is similar to that of natural fats. To produce the noncaloric triglyceride, glycerine is reacted with propylene oxide to form a polyether polyol which is esterified with a fatty acid. The first US patent covering the ingredient was issued to M. Pollard and J. White in August 29, 1989 and the company filed for patent protection in the European Economic Community (ECC) in 1988. Preliminary digestibility studies and applications work indicate that EPG is resistant to enzymatic hydrolysis and that it can be substituted for fats and oil in products such as table spreads, frozen desserts, salad dressings and bakery products. The company is encouraged by the results of the toxicity tests which eventually in 4 to 5 years will be used to petition the FDA for approval of EPG. (*Food Technol.*, 1989, p. 94).

A NEW PROPRIETARY WHEAT PROTEIN MARKETED BY A BELGIAN COMPANY

A new wheat protein was recently launched last February by the Belgian starch company Amylum. The product will be marketed under the trade name 'Amypro'. The new product was created for use as a replacer or extender of low-viscosity sodium caseinate, egg

yolk and other modified food emulsifiers.

Its gelling properties make it suitable for use in fish and meat products and as an egg yolk substitute in emulsified sauces and dressings. In addition Amypro has a protein content of 85% and is highly soluble. It can serve as a dough strength regulator and can be used as a cholesterol and fat replacer in many applications. Amypro also has potential in the imitation dairy market, in products like whipped toppings and ice cream. (*Food Eng., Int'l* 3/1990, p. 14).

A NEW NATURAL FRUIT JUICE — YOGHURT COMBINATION FOR INFANTS MARKETED IN USA

Gerber Products Company of USA, a leading producer of infant foods has recently introduced 'Fruit Juices with Low Fat Yoghurt Combination' which combines yoghurt and natural fruit juices in ready to serve bottles.

This is new landmark in infant nutrition. This new line is available in four varieties — Apple, Mixed Fruit, Banana Juice Medley and Pear Peach. Each 4.00 ml of bottle contains 120% of US Recommended Daily Allowance of Vit C with 90-100 calories per serving. The 45% low-fat yoghurt provides calcium and protein, and the juice contain 100 artificial flavors, colours or preservatives. It has stable shelf life and refrigeration is not needed until the bottle is opened. (*Food Eng., Int'l* 3/1990, p. 16).

SCOTTISH SALMON FARMS RECORD GREAT PROGRESS

Fish farming in and around Scotland's lochs has reached an astonishing level of success. In 1988, over 18,000 tons of salmon were harvested. By the end of 1990, that figure will jump 50%

to 28,000 tons. Several factors have contributed to the rise of salmon farming. Conditions in the lochs are very similar to the natural habitat of salmon, resulting in a very high-quality meat. The lochs also yield a high survival rate among the fish. (*Food Eng Int'l* 3/1990, p. 22).

TREHALOSE — A DISACCHARIDE PROMISES NATURAL FOOD PRESERVATION

Trehalose is a non-toxic, calorific disaccharide found in mushrooms, honey, some corals, brine, shrimps and baker's yeast. Chemically it is extremely stable and unlike other sugars, does not caramelize. In the human body enzymes break it down to glucose. Non-sweet trehalose is non specific and seems to protect the whole range of biomolecules under arid conditions. Proteins, carbohydrates, lipids and other macromolecules are surrounded by a film of water, which is essential to their structure and hence their functionality. During drying this water layer is gradually removed often causing irreversible changes. It is thought trehalose forms a protective film in place of water by hydrogen bonding to charged hydrated groups in the drying biomolecules as their bound structural water is lost. Another advantageous property of Trehalose is that it dries to a glassy layer on drying and never crystallizes.

The limiting factor to the development of trehalose drying is its price of around £300,000/tonne. At present trehalose is extracted from baker's yeast and is costly and only available as an expensive laboratory reagent. Extensive research can develop a process to make trehalose in bulk at the price of sugar. Such an achievement will be a new landmark for foods and drugs preservation with trehalose in the 21st century. (*Food Manuf* 4/1990, pp. 23-24).

GRAPESEED OIL — A NEGLECTED HEALTHY EDIBLE OIL RESOURCE

Grapeseed oil is a by-product of the wine industry. The oil has been used for generation in the Mediterranean countries and is now getting popular in USA as a cooking oil. The oil is extracted from wine grape seeds. After the grapes are pressed for harvest, the juice, the seeds and stems remain. Grapeseed oil manufacturers separate the seeds, then dry them, heat them and press the oil. It takes 1,000 lbs of wine grapes to manufacture 4 lbs of grapeseed oil.

Grapeseed oil has one of the lowest saturated fat levels in the cooking oils group. It contains more linoleic acid than any other cooking oils. Tests on the oils have shown that it contains 77% or more linoleic acid. The wine industry is coming up fast in Goa, Karnataka and Maharashtra. However, our grape industry is not aware of the significance of grapeseed oil. The grapeseeds are going to waste at present. Indian entrepreneurs should look at this waste for the production of grapeseed oil as an edible oil for consumption by the effluent health conscious section of urban India. (JAOCs 66 (8), 1989, 104, 3).

IN-VITRO FERTILIZATION CREATES DEMAND FOR FEMALE HUMAN EGG DONORS

An infertility clinic in Cambridge (UK) has achieved the distinction of being the first to advertise in print for women to donate eggs to infertile couples. An advertisement in the latest of Centrepiece published by the University Centre in Cambridge, seeks women who are 'fit, fertile and under 40'.

The Clinic 'The Grange Infertility Centre', has approached the Interim Licensing Authority but is not yet licensed' reports Cambridge University. The medical director of the clinic

reports the response to the advertisement has been fairly good. The clinic pays the donors expenses and lost wages.

Sperm donors have long been recruited in Britain to enable women to have children by artificial insemination. But the technique of in-vitro fertilization has created a demand for female donors to provide human eggs as well. (New Sc, 4/21/90, p. 26).

NEW INDUSTRIAL USES FOR VEGETABLE OILS ON THE HORIZON IN USA

Rising concerns for the dwindling supply of petroleum oils, for the environment and for worker safety; and the incentive to find new market opportunities for increasing efficient farmers have all contributed to rising interest in new industrial uses for vegetable oils.

With highly efficient farming in USA, resulting on rapid increases in vegetable oil production, it is no wonder that the US Dept. of Agriculture (USDA) is very active in research on new industrial uses of vegetable oils. USDA reports that with recent biotech advances, there is a good chance that the quantities produced will be even greater. Vegetable oil industrial feedstocks are one potential for market expansion for agriculture.

Other oilseeds, such as jojoba, lesquerella and vernonia, have industrial potential and may be grown in semi arid areas not available for traditional crops. These new crops may add a much needed boost to the local economies. Many countries dependent upon petroleum oil imports are interested in finding alternative sources of hydrocarbons.

Petroleum prices will rise as supplies decrease, it is only a matter of time and by how much. Crop oils being a renewable resource, can be substituted for petroleum oils in many applications and do much to extend the petroleum

supply.

Environmental factors are becoming increasingly important to consumers and manufacturers of oilseed products. For example, soybean oil based inks, while currently not completely biodegradable, are more so than conventional inks. Vernonia oil may be used to replace petroleum products in paints and coatings, resulting in product with reduced levels of volatile organic compounds.

Researchers at the Univ. of Idaho have developed an alcohol ester of rapeseed oil (AERO) that holds promise as a clean burning fuel. Researchers have found that visible emissions of 100% AERO fuels are several times lower than No.2 diesel fuel. Sulfur emission of AERO fuel is essentially zero, compared with that of diesel fuel at 0.250%. AERO fuel has only a trace of aromatics compared with 14% for diesel fuel.

The ignition characteristics of the AERO fuel are more than adequate, as reflected in a cetaric rating of 54 for AERO fuels compared with a rating of 48 for the current diesel fuel. Since current engines are built to burn diesel fuel researchers believe that engine modifications aimed at AERO usage would result in even better performance. Indirect injection engines which have fire combustion chambers operate much better than do the direct injection engines. (Inform 5/1990, p.p. 434-40)

DIRECTORY OF INDIAN PROCESSED FOOD & ALLIED INDUSTRIES PUBLISHED BY CFTRI (MYSORE)

The Central Food Technological Research Institute (Mysore) has recently published 'Directory of Indian Processed Food & Allied Industries'. The comprehensive directory lists over 400 major food processors, exporters and their products manufactured covering fruits, vegetables, cereals, dairy products, fish, meat, poultry, oilseeds, nuts, food additives, packaging etc.

In addition, the directory gives information on Food Laws & Regulations, financing, licensing and quality control agencies, training organisations, R & D organizations. Lastly, the directory gives an alphabetical index of range of products, flavours and food additives available in the country.

This CFTRI directory provides a ready reference guide to one and all in food processing. It is priced at Rs. 500/- per copy. Packing and forwarding charges are Rs. 25/- per copy. DD/Cheque/MO to be drawn in favour of Director, CFTRI, Mysore. In addition there is a surcharge of Rs. 10/- towards bank collection charges for outstation cheques. For copies write to: The Sales & Distribution Officer FOSTIS, CFTRI, Mysore - 570 013.

NON-TOXIC, BITTERING AGENT FINDS USE IN PROTECTING CHILDREN AND ANIMALS

Denatonium saccharide, said to be the world's bitterest substance is now available from Alomeric Chemicals (Farmingdale, New York USA).

It is marketed under the trade name Super Vilex. It is 5 to 6 times more bitter than denatonium benzoate and more stable. When directly impregnated into polymers and other plastics denatonium saccharide retains its bitter taste, making it an excellent aversive agent to prevent animals chewing or biting impregnated items such as pipes, electrical cables, garbage cans, etc.

It is non toxic and can therefore be impregnated into children's toy parts, making them unpleasant to chew or bite on. It can also be used in toxic household products like anti-freeze and cleaners, to prevent accidental ingestion by children and pets.

Coating materials containing denatonium saccharide, developed by Alomeric, can be used to dip or spray non-impregnated polymers or plastics

for protection.

Denatonium saccharide is available as a powder, concentrated solution or tablets. (*Manuf Chemist*, 7/1990, p. 49)

HIGH-OLEIC RAPESEED LINES PATENTED FOR COMMERCIALIZATION WORLDWIDE

Agrogenetics Company and Idaho Research Foundation have filed patent applications in USA for high rapeseed lines. Identified in the applications are lines with oleic levels up to 94%, saturated fats as low as 3%, polyunsaturated levels as low as 3% and no erucic acid.

Patent applications cover seeds, plants, methods for their improvement and vegetable oils derived from Brassica napus and Brassica campestris species. The plant applications were filed in the name of the Idaho Research Foundation for discoveries made by Dr. Dick Auld. Agrigenetics Company is the exclusive licensors of the discoveries.

Brassicas, the third most widely grown edible oilseed crop worldwide grows primarily in the relatively cool climates of Canada, northern USA, northern Europe and China. Oilseed varieties of the genus are sources of edible rapeseed, including canola. Canola oil has achieved commercial acceptance in USA based on low levels of saturated fat (currently at 6 to 7%) and moderately high levels of monounsaturates (approximately 60% oleic acid). US consumption of canola oil is expected to exceed 800 million pounds in 1990.

Dr. Auld reports, the discoveries are the result of conventional plant breeding to combination with mutagenesis. These are the first in a long line of specialty oilseed products expected to be developed from dynamic research programme. 'Very high oleic, low saturate oils represent nutritional and stability

breakthroughs for food processing markets and provide a valuable and unique raw material source for speciality chemical markets', reports SVO Enterprises (the specialty vegetable oil production and marketing division of Agrigenetics).

SVO plans to market the high oleic oils to its international customer base. Commercialization of the high oleic rapeseed lines is under way. SVO claims a leadership position in the production and marketing of high oleic vegetable oils with its patented 'Trisun' high oleic sunflower oil.

At 80% oleic levels, the product has applications in food and speciality chemical markets as a high quality, high-stability vegetable oil source, and is currently used in processed food products marketed to consumers in USA, Europe and Asia as an alternative to high saturated fats. (*CMR*, 7/9/90, pp. 9, 16).

TAKEDA RATED AS THE BEST MANAGED PHARMACEUTICAL COMPANY IN THE WORLD

Takeda (Japan) is by far the largest pharmaceutical company in Japan and the sixth largest in the world. However, size alone is hardly the best measure of Takeda's clout. In 1989, it produced its \$5 billion plus revenues with just 13,675 worldwide employees, making it one of the leanest, most efficient companies of its size in any industry. The majority of companies in the \$5 billion range have 40,000-50,000 workers. Even more significantly, Takeda spent a mind-boggling \$25,116 per employee on R & D in fiscal 1989. Nor is that figure an anomaly. Consistently over the past several years, Takeda has invested more on R & D than it has reserved in net income — an almost unheard of action for a major corporation, but perhaps not all that unexpected, for a company that boasts 11 PhD's on its 28 member board of directors. (*Chem Eng*, 7/1990, p. 42).

GLYCOLIC ACID FROM SUGAR-CANE FINDS NEW APPLICATION IN SKIN DERMATOLOGY

Glycolic acid, found in sugarcane plants is being used in USA to reverse some of sunlight's effects on human skin.

Researchers at the UCLA Medical Centre (USA) reported recently that glycolic acid in the form of alpha hydroxy acid when applied to human skin have provided marked improvement in skin texture and coloring. In addition, both fine and coarse wrinkles and scaly growths caused by the sun were improved.

The treatment consisted of bathing the skin with a 70% glycolic solution for 2 to 7 minutes and then having the patients use a 10% solution at home in daily applications for 3 to 6 months.

According to researchers, the glycolic acid appears to increase the amount of natural collagen and elastin in the skin. Further studies are under progress to determine the acid's full effect and reasons for them. (*Am. Pharmacy*, 6/6/90, p. 19).

NEW ENZYMES BOOST INDUSTRIAL ENZYME INDUSTRY WORLDWIDE

Recent report from L. Hepner & Associates (London, UK) asserts that the worldwide enzyme industry is poised for growth in the coming five years with new products and applications. Today's world market of \$700 million should grow to 41 billion by 1995.

This growth will be fueled by a new generation of genetically and protein engineered enzymes and have enzymes such as cellulase, hemi-cellulase, ligninase and xylanase. (*CMR*, 6/11/90, p. 9).

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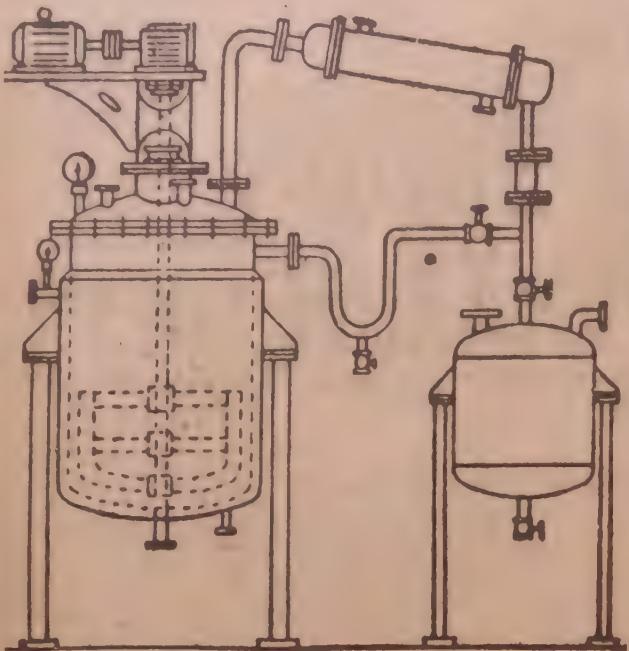
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Science Briefs

CRYOGENIC GRINDING OF CARDAMOM

Scientists at the Regional Research Laboratory (RRL), Trivandrum, have carried out experiments on very low temperature grinding or cryogrinding of cardamom seeds which improves the quality of cardamom powder by preventing the loss of highly volatile flavour constituents.

If cardamom seeds were ground in an ordinary grinding mill, a temperature of 42 degrees to 95 degrees celsius is attained, resulting in considerable (26 to 52 per cent) loss of the volatile oil that gives cardamom its characteristic aroma.

In Indian kitchens cardamom is generally ground for direct use immediately before mixing so that the volatile oil released in the process imparts its aroma to the food. But if cardamom is used in the form of ready-made powders, the aroma is lost.

Cryogrinding is a practical way to achieve a finely ground product without any loss of flavour. The process, apart from improving the product, is also reported to prevent oxidation and volatilisation of the essential oil, increase the dispersibility of the product, avoid the formation of 'specks' when added to food, and reduce sedimentation in liquid foods and the microbial count. The net result is that the original flavour and quality are retained to a greater extent.

Fresh dried green cardamoms were used in the RRL experiments. A 50-grams sample ground in the laboratory mixer was used as the control sample. Five kilograms of cardamom seeds were ground in an industrial mill and the resulting powder was analysed for loss of volatile oils.

The cryogrinding experiments were

carried out on seeds at -18 degrees celcius (deep freezer), seeds cooled in dry ice (solid carbon dioxide gas) and seeds cooled in liquid nitrogen (-180 degrees to -190 degrees celcius). The moisture and volatile oil content of ground samples were determined on the same day.

The experiments showed that the product from the industrial mill lost, on an average 25 per cent of volatile oil. In continuous fine grinding the loss was much more due to heating. Grinding of cardamom at -18 degrees celcius did not yield any better results.

But cryogenic grinding with dry ice yielded a much superior product. The temperature of the ground sample was lower (-15 degrees to -65 degrees celcius) and the loss of oil was only 8 per cent. Cryogrinding with liquid nitrogen took more time and the oil content in the product was the highest. Further work on different varieties of cardamoms grown in India is in progress.

— P.T.I. Science Service
September 1-15, 1990

SUPERALLOYS: GRAPPLING WITH HIGH-TEMPERATURE PROBLEMS

Scientists at the Hyderabad-based Mishra Dhatu Nigam Limited (Midhani) have recently reported success in their efforts at developing superalloys indigenously, in the process opening new channels for their use in important sectors of the Indian industry. Superalloys have been much sought after due to their excellent strength in high temperature ranges. This in combination with their significant anti-corrosive properties have resulted in their being used increasingly in the critical areas of aeronautics and atomic energy. Until a few years ago, the country's entire requirement was met by imports.

In an effort to indigenise superalloy production, the government set up the superalloy project. The Midhani plant

is equipped with advanced facilities for production and testing of superalloys. Scientists there have developed and commercially produced a number of superalloy metals while simultaneously recording data generated during the course of research.

Technically, a superalloy is defined as an alloy developed for elevated temperature service, particularly in areas where relatively severe mechanical stressing is encountered and where high surface stability is frequently required.

Superalloys, classically, are those utilised in the hottest parts of aircraft jet engines and industrial turbines. In fact, it is the demand of these technically sophisticated applications that created the need for these materials.

The capacity to cater to high temperature ranges is vital, and of late has acquired great importance because the high energy needed for many industrial processes is met by very few methods.

The superalloys' properties revolve around a basic principle, according to which the efficiency of a machinery which produces electricity or some other form of power from a heat source depends on the difference between its highest operating temperature and its lowest temperature.

Thus, the greater this difference, the more efficient is the device — a result that gives great impetus to create materials that operate at very high temperature. In addition to possessing strength, superalloys must resist chemical attacks from the environment in which they function.

Most commonly, this attack is characterised by a simple oxidation of the surface. However in machines which utilize crude or residual oils or coal or its products for fuel, natural or acquired contaminants can cause severe and complex chemical attacks.

Involved reactions with sulphur, sodium, potassium, vanadium, and other elements which appear in these fuels can destroy high-temperature metals rapidly, sometimes in a matter of a few hours. This is called hot corrosion, and scientists world wide are currently grappling with this major problem facing otherwise well-suited alloys for service in turbines operating in the combustion products of coal.

Some nuclear reactors operate, for instance, above 1,000 degrees fahrenheit, and the working fluid is often not an oxidising gas. In this case, high-temperature gas cooled reactors utilise high-temperature, high-pressure helium. However, the helium inevitably contains very low levels of impurities like oxygen, carbon, hydrogen, and others.

Since the helium atmosphere does not contain enough oxygen to form a protective oxide film on the metals which contain it, impurities enter these alloys readily, reducing their strength by precipitating excessive amounts of oxide and carbide phases and by other deleterious effects.

There are exceptions. The refractory metal molybdenum is characteristically very resistant to this attack. It does not react significantly with low concentrations of oxygen in helium and appears resistant to carbons as well.

However, in the case of other superalloys it has not been possible to match the helium reactor atmosphere as the former has suffered severe attacks and significant loss of strength. For gas turbines, this is a new problem, and superalloy metallurgists are working to develop more resistant materials for this function.

Superalloys are under supervision for other kinds of application around the world. In the case of the liquid metal fast breeder reactor, the superalloy metals must resist the high-temperature liquid metal used to transfer heat from

hot plutonium-uranium fuel. The liquid metal is usually sodium or potassium.

However, the most significant problem remains that of resistance to oxidation and high-temperature corrosion in present heat engines. Superalloys contains small-to-moderate amounts of highly reactive elements such as chromium and aluminium which react easily with oxygen to form a thin semiplastic oxide surface film. This prevents further reaction of the aggressive environment with the underlying metal.

This metal protective system works well when oxidation is the only or primary type of attack. However when contaminants like vanadium are present they react to destroy the protective oxide and eventually the alloy. Metallurgists have been actively trying to circumvent the problem and coating seems to be one of the likely solutions. This is essentially done by adding elements such as chromium and aluminium into the surface of the alloy. These elements react with the hostile environment to form very protective oxides.

Researchers at Midhani have meanwhile been engaged in the manufacture of a wide variety of special metals and alloys. Among the superalloys currently under production are the complete spectrum comprising iron base, iron-nickel base, nickel base and cobalt base in wrought form or as cast sticks.

One of the successful areas in Midhani has been the production of Superco 605, a well-known wrought cobalt superalloy which has been widely used for hot sections of gas turbines, for nuclear reactor components, for surgical implants and in the cold worked condition for fasteners and wear pads. The scientists have manufactured this material in the form of forged bars and cold rolled strips.

The researchers are branching out into various areas, particularly in the production of Russian superalloys indi-

genously. Midhani which has been able to market sizeable quantities of superalloy items to different industry sectors is also sponsoring research in some non-aeronautical applications of superalloys.

— P.T.I. Science Service
September 1-15, 1990.

HYPERTHERMIA — A NEW DIMENSION IN CANCER TREATMENT

Hyperthermia, which involves preferential killing of malignant tumours by raising their temperature, is offering a new dimension to the treatment of cancer. Current methods of cancer treatment involve either simple cutting and killing of the cancerous tissue or radiation therapy.

But in recent times, a new technique, hyperthermia, is being advocated as an alternative therapy, according to a report by Dr. B.B. Singh, a radiologist at the Bhabha Atomic Research Centre, Bombay. During hyperthermia, the temperature of the tumour is raised to 42-43 degrees celsius — an increase which is lethal to the tumour cells but does not affect the surrounding tissues. Clinical trials have already been initiated in many countries and scientists are addressing themselves to some important questions like what is the best method to heat specific regions in the body, what is the mechanism behind hyperthermic damage to tumours and what are the side-effects of such a treatment and ways to minimise them.

At clinical temperatures, while tumours show heat-induced regressions, the surrounding normal tissues do not exhibit any signs of damage. The reason is believed to be the intrinsic anatomical and functional properties of malignant and normal tissues. The blood vessels inside growing tumours are different from those of normal tissues. The tumours' capillaries lack an external coating membrane, nervous apparatus and receptors for external stimuli.

The rapid growth of the tumour cell population also exerts a high hydrostatic pressure on the tumour cells. Greater damage is inflicted on the tumour cells as the impaired blood transfusion in the tumours does not allow proper heat dissipation from them. This renders the intra-tumour environment hypoxic, acidic and nutrient-deficient.

Hyperthermia devices for delivering a known quantity of heat to a localised malignant tissue employ electromagnetic waves and are supplied with specialised coupled applicators and computerised control systems. The most promising sources are radio frequency generators, microwaves and ultrasound machines.

It is easier to localise heat with ultrasound compared to electro-magnetic heating. The energy can be easily focussed into a defined volume using plastic lenses and curved transducers. The area of heat deposition can thus be varied by moving the focussing arrangement from the target volume.

Quartz transducers of 16-cm diameter and plastic lenses of diverse focal lengths have been designed to treat small tumours up to 8 cms depth. For large tumours, uniform heating can be achieved by scanning methods.

Temperature measurements within the tumours present a major problem. Since the thermal conductivity of tissue varies over small regions, the distribution of heat is not homogenous. Besides, use of thermocouples or thermistors, which act as antennae in radio and microwave fields, would cause local perturbations in heat distribution. Hence, very often, the temperature is measured by estimating the decline in temperature over a certain period of time after power switch-off.

In view of these limitations, scientists are attempting to develop non-metallic devices. Non-thermal probes include optical systems using fluores-

cent emissions from rare earth phosphors and liquid crystals or birefringent crystals.

Non-invasive methods of temperature measurements employ such techniques as thermo-acoustic sensing, microwave radiometry, infra-red thermography and nuclear magnetic resonance. However, more research is needed before these methods can be exploited in clinical practice. Apart from localised heating, whole body hyperthermia is also being suggested for treating metastatic tumours. Various techniques for whole body hyperthermia include the use of hot air and hot water, hot wax, infrared heating, thermally controlled suits, extracorporeal heated blood and inoculation of pyrogenic bacteria and toxins.

Considerable attempts have been made to identify the cellular targets for hyperthermic killing of cells and cellular membranes appear to be the most favoured. The thermal sensitivity of cells appears to be regulated by a number of factors like lipid composition, the cell membrane proteins and others like the concentration of calcium ions.

There are also proposals to combine hyperthermia with other therapies like radiation therapy and chemotherapy. Radiation therapy accounts for over 90 per cent of cancer treatment modality but suffers from two major drawbacks — it is not effective against cells which are in the S-phase of their growth and cells that are hypoxic and nutrient deficient. Hyperthermia is known to be effective in both cases and the combination of radiation and hyperthermia should logically improve the cure rate, a report says.

In trials involving 467 patients in Japan, hyperthermia plus radio-therapy elicited a critical response in 46 per cent cases, and partial response in 37 per cent. Similarly, use of membrane-interacting drugs like procaine, phenothiazines and indomethacin hold great

promise when combined with hyperthermia

However, a protocol involving chemotherapy and drugs requires careful planning, especially because some drugs become cytotoxic at elevated temperatures causing renal or cardiac damage. In general, cancer treatment includes a comprehensive combination of surgery, radiotherapy and chemotherapy. Hyperthermia can be included in the protocol, say doctors.

— P.T.I. Science Service
September 1-15, 1990

SOLAR FRIDGE FOR PRESERVING DRUGS

A solar photovoltaic refrigeration system has been developed by Tungabhadra Steel Products Limited, Karnataka, to preserve drugs and vaccines.

The refrigeration principle used in the "Solar Vaccine Saver VR 100" is unique in that there are no moving parts, motor, compressor or the working fluid for producing refrigeration effect. The system uses a solid state thermoelectric module for pumping out heat, thereby producing cooling effect.

The electrical energy required is supplied by direct conversion of solar energy into electrical energy by photovoltaic modules provided with the system. The system comprises 120 Wp PV module driving thermoelectric module of 60 Watts capacity and is backed up with electrical energy storage. Stored energy operates the system during night and cloudy weather conditions, ensuring a stable temperature for the drugs and vaccines stored inside (maintained between 4 to 10 degrees celsius). It can hold four kgs of vaccine and drugs. Energy storage is handled by a sealed jet type lead acid battery charged and discharged through an electronic regulator with built-in controls for prevention of overcharging deep discharging shortcircuit protection and protection against polarity reversal.

New Products

GAS MONITOR WITH RECORDER & ALARM

Subtronics has introduced single pen potentiometric circular chart recorder which records gas concentrations in air of benzene, hydrogen, cyanides, carbon monoxide, methane etc. for 8 hours of working. This has gas monitor which visually reads three status, green/yellow/red via low/medium/high concentrations of gas/fumes with selection of three levels such as 0-100, 100-500, 500-1000 PPM to sound audio alarm at selected desired level.

As per new factory-act recording (for 8 hours of working) of combustible, toxic, poisonous vapours is essential. It has an facility to have potential free N.O./N.C. contact. Equipment works on 230 V.A.C. or 6 V.D.C. only. Thus better safety than 12 V.D.C. fully solid-state technology has plug-in types of hermetically sealed modules for industrial use for a long life.

It detects, records and alarms L.P.G., combustible gases, smoke, hydrocarbons, ammonia, hexane, hydrogen, acetone, alcohols, esters, phenol and spirit, MEK, ethyl acetate, SO₂ and HF, ethylene oxide, acrylonitrile, carbon monoxide, toluene, xylene, H₂S, ethylene gas, n-heptane, chloroform, ketones, acetylene, HCN, ACN, formaldehyde etc. Very easy to instal, operate and maintain because of simplicity and Kit-form.

Detectors can be 200 mtrs. away from controller unit. Useful as environment/explosive/air pollution monitoring with one thousand installations in India and abroad for over 16 years used in the field. The monitor has facility to function one, two or five flameproof detectors remotely with independent alarm LED-latching with a common reset push switch. It has 6 volt battery back-up arrangement available in percentage or PPM levels. 1 1/2 minute timer prevents

false alarm in case of main failure. Monitor/records concentrations at low levels but alarms only in case of dangerous/high at TLV/LEL concentrations. User areas include chemical and fertiliser plants, pharmaceutical & petrochemical units, gas plants, hotels and various industries.



MOULDED RUBBER PAD

S.S. Azad & Associates, Rubber Consultancy Services, has developed synthetic rubber-based anti-vibratory sets, heavy duty compressors, over-head cranes and other sensitive equipment. Based on the specified compressive force, on a pre-calculated compression set of 10 per cent maximum, the formulation of the synthetic rubbers and the design of the moulded ribbed rubber pads has postulated non-extractable type of polymer, allowing for a period of not more than 7.5 per cent swelling in transformer oil at elevated temperatures.

The device is useful for heavy foundations — to protect from damage highly sensitive equipment which operate in areas of erratic vibrations. It is recommended for water coolers, airconditioners, refrigerators, marine engines, printing machines, washing machines, accounting machines, industrial sewing machines, spinning frames, vibrating sieve graders, teleprinters, submersible

pumps, air compressors, pneumatic drills, steam hammers, eccentric presses, cracker mills, jaw crushers, etc.

Such pre-design load bearing rubber pads with built-in springy action help reduce the noise level, as well as, alleviate transmission of erratic vibrations and ensure prolonged service of such expensive and sensitive equipment. For details contact: Rubber Centre, C-25/221, M.I.G., Bandra (East), Bombay 400 051.

POWDER COATING MACHINE

An economical powder coating machine using the cloud chamber method is now made in India. Hakostatik designed by Automatic Electric Ltd., is a unique self-contained system that coats objects purely by electrostatic means. No aircompressor filter, spray gun, spray booth or powder reclamation systems are required. The Hakostatik powder coating machine guarantees a superior, attractive and durable coating that is corrosion and chemical resistant.

The objects to be coated are suspended in the powder chamber in which the selected powder paint is already at the bottom. After sliding back the lid, the machine is switched on for a few seconds. The powder paint is vigorously agitated to rise and coat the object. The unused powder is once again whirled up in the next cycle resulting in near 100 per cent utilisation.

Colour change is effected simply interchanging the interior coating chamber. The result: a smooth even finish that can be as fine as 25 mm. It is economical too: the cost of powder coating by Hakostatik is only 1ps. per sq. inch. A big saving especially when it replaces traditional process of wet-painting, electroplating, anodizing etc. For details contact: Hakostatik Powder Coating Centre, Shivlal Motilal Mansion, Bellasis Road, Bombay 400 008.

GRIP WITH RPGRIP

A new device to fasten hoses to nozzle has been introduced in India. RPGRIP, made of rust-proof material, is the first such device made in India. Manufactured by R.P. Products, 82, Sanjay Building, No. 5, B Wing, Mittal Ind. Estate, Andheri (E), Bombay 400 059, (Tel.: 6348085), RPGRIP offers several advantages of conventional fastening methods, including the hose clip.



RPGRIP is simple to operate and can be fastened with just the fingers. It is engineered to withstand rust. Its special design ensures a 100% grip, without damaging the hose. Currently, RPGRIP is readily available in various sizes. The manufacturer is also offering the clips as per customer's special requirements.

METERING/DOSING PUMPS

Ishopan Metering Pumps are plunger or diaphragm pumps for the controlled volume feeding of fluids. For delivery setting and variation, their stroke lengths can be adjusted infinitely between zero and 100 per cent of max. capacity, both while operating or stationary. They are suitable for continuous batch metering applications in chemical, petrochemical, food, beverage, pharmaceuticals, electronics, paper and pulp and other industries. These pumps are designed according to building block system permitting all desired combinations of drives, gears, pumpeheads, including stroke length and stroking speed variation devices.

This modular design provides for optimum adaption of the metering group to a particular metering problem. The pumpeheads are offered in a variety of materials for virtually all kinds of liquids. They are available as single head units or with two or more pumpeheads driven by a common motor.

For details contact: Ishopan Engineering Pvt. Ltd., 1/10, Juhu Darshan Bldg., New D.N. Nagar, Andheri (W), Bombay 400 058.

Dr. BECK & CO. LAUNCHES EPOXY PUTTY

Beck India was established in 1956 in collaboration with Dr. Beck & Co. AG, Hamburg, Germany (now part of BASF AG), primarily to manufacture a wide range of synthetic insulating materials for the Indian electrical industry. In course of time the company established itself as the leader in producing not only a range of insulating materials but also a variety of polymer products for various industries.

In December 1967, a devastating earthquake measuring 6.5 on the Richter scale hit Koynaagar town, causing extensive damage to crops and houses. The Koyna dam situated only 2.5 kms.

from the epicentre had a miraculous escape. This had called for use of only certain epoxy resin systems to prevent more damage than had already been caused. Beck resins did the job and plugged the cracks by grouting in the 103 m. dam.

Since then, epoxy resins and epoxy based compounds from Dr. Beck & Co. have been used for several applications in the electrical and civil engineering industries; the major ones being: grouting of cracks in concrete, airfield runway repairs, corrosion and chemical resistant coatings, water-proofing, preparing foundations for heavy machines and so on. The Beck epoxy putty, which has been marketed for over 20 years, under the most popular brand name, now comes directly as Beck Bond from the manufacturers of the original seal, Dr. Beck & Co. (India) Ltd.

Beck Bond is a two component, multipurpose epoxy putty (made of a resin and a hardener). It has the properties of strong adhesion, quick setting and ease of application. It is light weight, non-toxic, does not absorb water, does not dissolve in most chemicals and can be surface-coated by any paint or lacquer. It is convenient, easy to mix, non-sticky and can be adapted to multifarious uses, such as sealing



leaks in pipelines, plugging blow-holes in castings, repairing dents in automobiles, mending cable joints in electrical lines, filling cracks in concrete and sticking broken glass and ceramic.

The Beck Bond epoxy putty comes in two types, E-11 and E-12. Each of these is made of green resin component and a black hardener component. Beck Bond E-11 is the normal curing epoxy putty. It sets in 2 hours and comes in yellow coloured packs of 100 g and 1 kg. Beck Bond E-12 is the fast curing epoxy putty. It sets within an hour and is available in 75 g and 900 g packs in blue colour.

Technical specifications are as shown in the following table:

For details contact: Dr. Beck & Co. (India) Ltd., Indrayani, 92/11, Chiplunkar Road, Pune 411 004.

DIGITAL TEMPERATURE INDICATORS

M.B. Control offers Model DT-201 Digital Temperature Indicator, using latest integrated technology for reliable and accurate temperature measurement. DT-201 accepts as inputs all types of temperature sensors and linear signals.

The instrument accuracy is within $\pm 0.5\%$ to $\pm 1\% \pm LS$ digit. DT-201 with point to point linearisation, providing error within $\pm 1^\circ C$ over the full range are also available.

M.B. Control offers Model DT-202 Digital Temperature Indicator. Having two-way manual temperature selector switch for measuring temperature from two channels. Using latest integrated technology for reliable and accurate temperature measurement. DT-202 with point to point linearisation providing error within $\pm 1^\circ$ over the full range are also available.

M.B. Control offers Model DT-206 Digital Temperature Indicator. Having six-way manual temperature selector switch using latest integrated technology for reliable and accurate temperature measurement. The unit accepts as inputs all types of temperature sensors. The instruments accuracy is within $\pm 0.5\%$ to $\pm 1\% \pm LS$ digit.

Two-component multi-purpose epoxy sealing system (putty)

	Beck Bond E-11	Beck Bond E-12
1. Mixing proportion of 2 components (by weight)		
2. Processing time — Pot life at 25°C for 500 g mixture	35-40 minutes	10-15 minutes
— Hardening time at room temperature	approx. 2 hours	approx. 1 hour
3. Recommended curing time to obtain the best cured properties		
At 20°C	48 hours	24 hours
At 30°C	20-24 hours	12-16 hours
At 40°C	16-20 hours	4-8 hours
4. Properties of the cured compound (specimen curing — 24 hours at R.T.)		
Properties	Specification	Unit
Tensile strength	DIN 53455	N/mm ²
Flexural strength	DIN 53452	N/mm ²
Impact strength — unnotched	DIN 53453	kJ/m ²
Impact strength — notched	DIN 53453	kJ/m ²
Compressive strength	DIN 53454	N/mm ²
Heat distortion temperature	DIN 53458	°C
Volume resistivity at 1000 V DC	DIN 53482	
a) at R.T.		Ohm cm.
b) after 24 hours immersion in water		2.9 x 10 ¹¹
Dielectric strength at R.T.	DIN 53481	kV/mm
Water absorption	DIN 53475	mg (% wt)
Hardness	DIN 53505	Shore D
Density	DIN 53479	g/cm ³
Adhesive strength (M.S. to M.S. 4 sq. cm. joint area)		
a) Tensile		N/mm ²
b) Shear		9.6
		9.0
		8.9
5. A cured beck bond seal can be machined, sand-papered and painted. It's not affected by normal heat and moisture conditions or by mild chemicals. It also has high insulation properties.		

DT-206 with point to point linearisation providing error within $\pm 1^\circ\text{C}$ over the full range are also available. Automatic cold junction compensation and line resistance compensation is provided in all the three models. The units have built-in sensor break indication and protection. Power supply is 220/110 V AC.



All three models undergo dynamic burn-in test to weed out any component failure. These instruments are housed in size 96 x 96 x 160 mm. DIN standard strong metal enclosure. These indications are ideally suited for ovens, fur-

naces, tea industries, plywood, paper, cement, steel, fertilisers, beverages, food processing plants etc.

M.B. Control & Systems Pvt. Ltd., 31/1, Ahiripukur Road, Calcutta 700 019.

ANTI-SPILL CONTROL SYSTEM

Hectronic Aq., Switzerland's anti-spill system prevents spillage when filling tanks and tankers with mineral oil products and other liquids hazardous to water supplies. The system is checked every second to ensure the system's efficiency.



For further details please contact:

The electro-optical sensor is an optical system which can distinguish the different refractive indices of air and liquid. It has a sturdy flame proof housing. Ing Tech Engineering Co. are the representatives in India.

For details contact: Ing Tech Engineering Co. (Regd.), Taj Building, 3rd Floor, 210, Dr. D.N. Road, Bombay 400 001.

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Fertilizer Prospects in Nineties*

Y.R. PAKKALA
Consultant — RCF Ltd., Bombay

The greatest challenge facing the coming decade is to feed our increasing population which is expected to reach 1000 millions by the year 1999 from the present level of 800 million. In order to feed the masses, massive efforts are needed to step up the food production from the current level of 173 million tonnes to 240 million tonnes. This would merely maintain the existing minimal nutritional level of 500 gms/day capacity of food grains.

Due to pressure on land because of urbanisation, industrial development and required infrastructural facilities, cultivated area of 1765 million hectares of gross cropped area is expected to reduce to 159 million hectares by the turn of the century. We have, therefore, to improve our low productivity levels. Within the country, there is a wide variation in the food grains yield.

To achieve the targeted food grains output, the average yield has to be stepped upto 2285 kgs/ha. by 1999. The food grain production can be increased through improved irrigation, higher fertilizer consumption, improved seeds and adopting dry land cultivation. One of the definite methods of improving food production is by application of fertilizers. As a thumb rule, one tonne of fertilizer application should yield an additional production of 10 tonnes of food grains.

The estimated current consumption of fertilizers is of the order of 12.5 million tonnes of nutrient comprising 7.9 million tonnes of nitrogen, 3.4 million tonnes of P_2O_5 and the balance K_2O . At the end of the 8th Five Year Plan, the demand of nutrients is expected to be of the order of 16 million tonnes, consisting of 10 million tonnes of nitrogen, 4.3 million tonnes of phosphates and the balance K_2O . The total installed capacity of nitrogenous fertilizers at the end of 7th Five Year Plan is 8.14 million tonnes as against the target of 9.2 million tonnes. The short fall of 1.15 million tonnes is due to delay in the implementation of the three gas based plants on the HBJ pipe line (Shahajahanpur, Babrala and Gadepan in Kota) and the delay in commissioning of the Haldia Fertilizer Project. The projected installed capacity of phosphatic fertilizer at the end of the 7th Five Year Plan was 2.89 million tonnes as against the actual capacity of 2.75 MT materialised.

One of the very encouraging factors in the fertilizer production in the country was the progressive increase in capacity utilisation. In nitrogen, the all India average of capacity

utilisation increased from 53% in 1980-81 to 85.2% in 1988-89. In the phosphatic fertilizer plants the average capacity utilisation went up from 65% in 1980-81 to 86.8% during 1988-89. The capacity utilisation would have been higher if the perennially inefficient production units had been deleted from consideration.

Out of the 45 large sized fertilizer plants, 14 plants operated under 100%, 5 plants between 90% and 100%, 12 plants between 80% and 90%, 3 plants between 70% and 80% and the remaining 11 plants below 70% capacity utilisation level during 1988-89.

The degree of self-reliance achieved in the area of fertilizer production could be judged from the progressive reduction of imports of fertilizers. In the new fertilizer projects, a large component of indigenous supply of capital goods is being used. The extent of supply of indigenous equipment is of the order of 70% in case of nitrogenous fertilizers.

Another unique feature in our country is usage of a variety of feedstock for nitrogenous fertilizer production. The present installed capacity is based on 44.7% natural gas as feedstock, 27.9% on naphtha, 14.4% on fuel oil and the balance 13% on coal, coke oven gas, power and external ammonia. Natural gas would be the predominant feedstock for the nitrogenous fertilizer in the country.

The global availability of urea is becoming tight. This is mainly due to the large purchases of fertilizer by China and Latin America. It is estimated that there will be shortage of nitrogen at the global level by 0.7 million tonnes by 1992-93. In view of the above, India may have to concentrate on the indigenous production of fertilizers for maintaining its targeted food production.

There are over 35 large sized fertilizer plants of different vintages operating in the country. A large number of plants have operated for more than 15 years. Since technologies used in those early years were not specifically energy economy oriented, the energy consumption as well as the equipments provided leaves room for considerable improvement. With the availability of large number of energy efficient processes and improved equipments, it is very attractive to retrofit these plants. This would not only enable to improve the plant operation but would also increase the capacity of the plant to the extent of 10-12% depending on the equipments already existing in the plant. A massive retrofitting programme has to be embarked upon which would reduce the overall oper-

* Paper presented at the seminar on Chemical Industry -- Past, Present & Future, organised by I.I.Ch.E. in Bombay in September 1990.

ating cost and also improve the reliability as well as the safety of the plants.

Among the new plants doubling of the capacities of the three, 1350 tpd ammonia and associated urea plants in the HBJ pipeline appears to be bright. These plants have performed well during the last year.

In case of phosphatic fertilizers, the retrofitting of the existing plant by pipe reactors and other improved techniques would increase the production of the existing plants besides reducing the energy consumption.

Due to the fluctuating price of imported phosphoric acid for production of DAP, proposals for installation of nitrophosphate plants are expected to be favourably considered during this plan period. This would not only save valuable foreign exchange in the import of sulphur or phosphoric acid but would also supply nitrophosphate with varying water solubility that could cater to the needs of acidic as well as alkaline soils. Two such nitrophosphate plants are under construction, one at GNFC, Bharuch and another by Deepak Fertilizers at Taloja which are expected to go into production during the course of the year.

In order to reduce the dependence on phosphoric acid, coastal based phosphoric acid plants are expected to be installed, wherever DAP plants based on imported phosphoric acid are in operation.

Serious effort is being made to have joint ventures in the Middle East countries, where abundant raw material supply of rock phosphate, sulphur and gas are available to produce phosphoric acid as well as phosphatic fertilizers.

This would enable the Indian equipment manufacturers to supply most of the equipment and undertake the complete execution and operation of the project by the Indian companies along with the joint venture partners. This would ensure a regular supply of phosphoric acid for the Indian fertilizer companies for a long period.

One of the interesting trends in the 8th Five Year Plan projects would be the installation of small sized ammonia plants, varying in capacity from 400 to 600 tpd followed by downstream plants like Urea or Nitrophosphate. These are based on low energy technologies that have been recently developed for small sized plants. They are as economical as a large sized plants in capital cost as well as in operating costs. The small sized plants due to its lower capital costs, would enable a number of private sector companies to venture into this field and the location could be dispersed depending on market considerations. This would to a great extent relieve the criss-cross movement of fertilizers and also generate employment

potential at the rural areas. The reliability of these plants have been enhanced due to the sophisticated instrumentation as well as the controls by the DDC.

With the gas strikes in different parts of the country, the installation of a small sized fertilizer plant appears to be an ideal solution for utilisation of the limited gas finds.

Two new phosphatic fertilizers, one based on phosphoric acid and another based on nitric acid have been developed. The ammonium polyphosphate contains 56% P_2O_5 and 12% nitrogen with the poly content of 15-18%. This is produced by reacting hot phosphoric acid with gaseous ammonia in a pipe reactor where due to the high exothermic reaction, free water is evaporated, resulting in the formation of ammonium polyphosphate melt. This melt is sprayed in the form of a fine misty spray through a special nozzle on a bed of fines in a drum granulator. The granulator is fitted with inlet spirals and number of special designed lifter plates so as to have a uniform curtain of falling fines through the cross-section of the granulator. The granulated material is discharged to a double deck screen where particle sizes of 2.5 mm to 4 mm is separated as a product. The over-sized materials after crushing is fed back to the granulator and the recycle ratio is maintained at 2.5-3.5.

The other fertilizer which is based on acidulation of rock phosphate with nitric acid is mixed with molten urea and thereafter the excess water from the slurry is removed by sparging of hot air. The slurry is discharged from the dehydrator into a non-flighted granulator along with recycled product fines and crushed over-size. Dry air is sprayed through the rolling bed of the solids in the granulator. This air provides cooling and further removal of moisture. The granules discharged from the granulator is lifted by the bucket elevator to a flighted rotary drum. Here air is sent counter-current to the flow of granules. The material is sent to a vibrating screen and the fines and crushed over-size are returned to the granulator as a recycle. The product contains 27% nitrogen, 9% P_2O_5 with the complete water soluble phosphate. Extensive agronomic tests for both the above fertilizers are in progress in various agricultural Universities and have given very encouraging results. A 300 tpd ammonium polyphosphate plant is expected to be installed during the 8th Five Year Plan.

Conclusion

All our efforts have to be put in the execution of new projects as well as the retrofitting the old plants so that the plants could go into full production without much loss of time. The fertilizer prices are expected to harden up during the coming year and the completion of projects at the earliest would enable the country to save considerable foreign exchange. Experience in small sized ammonia plants would give impetus for building large number of units all over the country.

Some Recent Developments in the Technology of Production of Natural Essential Oils in India

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Essential oils obtained from higher plants are one of the main raw materials used for manufacture of perfumes, flavours and cosmetics. In spite of considerable development in production of synthetic perfumery and flavouring chemicals, essential oils continue to be the important raw materials for these industries throughout the world. About 20 years ago, it was predicted that because of cheaper availability of synthetic substitutes, use of essential oils in these industries would finally disappear. However, because of the cost of petroleum products and turpentine oil, the two main starting materials for synthesis of perfumery chemicals, there has been a general trend of increased use of essential oils by the industry during the recent years. The general realisation of health hazards associated with the synthetic chemicals in the West has also contributed to increased use of natural raw materials especially for high grade perfumes and flavours. This trend is expected to affect even the developing countries in the near future because of greater awareness of environment and ecology in these countries. These raw materials should be much more important for future industrial development in the Third World as production of these materials does not depend upon the traditional sources of energy like electricity, petrol or coal, but the oils are obtained from renewable energy sources.

Because of its wide variety of climate and soil, India is one of the few countries of the world where all the major essential oils used in perfumery, cosmetics or flavour industries can be produced in one or the other region of the country.

Prior to independence, India was producing only a small number of essential oils which included lemongrass oil, sandalwood oil, palmarosa oil, and vetiver oil. Considerable research and development work has been done during the last 40 years to improve the existing technology of production of essential oils. As a result of work done in the last 30 years, the country has become self-sufficient in a number of exotic essential oils which were introduced from other countries. These include Japanese mint (*Mentha arvensis L.*) Peppermint (*Mentha piperita L.*), Spearmint (*Mentha spicata L.*), Bergamot mint (*Mentha citrata Ehrh.*), Java citronella (*Cymbopogon winterianus Jowitt*), and Eucalyptus (*Eucalyptus citriodora Hook.*). Technology for cultivation of indigenous essential oils like lemongrass (*Cymbopogon flexuosus* (Steud. Wats.), palmarosa (*Cymbopogon martinii var. motia*),

vetiver (*Vetiveria zizanioides L. Nash*) was also improved. However, even after improvements of these technologies, the cost of production was high and yield per unit area was low. As such, the country could not establish a large essential oil industry for entering into the export market. In fact, instead of increase in export, the export have generally declined during the last 10 years mainly because of steep decline in production of lemongrass and sandalwood oils.

During the last 10 years special efforts have been made to improve the existing technologies so that we can increase the yield and decrease the cost of production so as to allow the Indian producers to compete in the world market. Efforts have also been made to introduce new essential oil-bearing plants, which were still imported from abroad. Major emphasis has been laid to improve the existing varieties using modern methods of plant breeding and to improve the existing agronomic practices.

Attempts have also been made to improve the process technologies especially for cottage industries and small scale units so as to improve the yield and quality of oil and cut down the cost of production. Although more than 100 essential oils are used in the industry throughout the world today, attempt will be made to discuss only those which have a large market and which can be easily cultivated in India.

Lemongrass oil (*Cymbopogon flexuosus* Steud. Wats.)

Oil of lemongrass, often referred as East Indian lemongrass oil, is obtained from the leaves of *Cymbopogon flexuosus*. This oil is much superior and fetches better prices than the West Indian lemongrass oil obtained from *Cymbopogon citratus* (DC.) Stapf, cultivated in Central America. At one time India used to supply more than 80% of the world requirement of lemongrass oil and Indian exports went up to 1,500 tonnes during the early 50s. However, there has been a gradual fall in production of the oil in the last 30 years and the production has gone down to 200-300 tonnes during the last few years. This has happened because the indigenous production was based on the collection of grass from forests and use of primitive methods of distillation. The natural growth of lemongrass has dwindled because of indiscriminate collection and deforestation as well as intermittent drought in Kerala where most of the oil was produced.

Research and development work done by Central Institute of Medicinal and Aromatic Plants (CIMAP) and other laboratories of the country during the last 10 years have shown that lemongrass can be profitably cultivated by using modern methods of agriculture (10). CIMAP has also developed three new high yielding varieties, the first variety developed by the Institute through clonal selection in 1985 was designated as CIMAP LS-48 (var. PRAGATI), which gives 50% more yield of oil than the existing variety OD-19 developed by the Kerala Agricultural University at Odakkali in Kerala (Table 1). The second variety, CAUVERI, just being released is suitable for South India and has been developed by CIMAP Regional Centre, Bangalore. This variety gives 30% higher yield than the variety 'PRAGATI' released earlier (4) (Table 2). Improved agronomic practices like fertilizer application, weed control and crop geometry have also been developed. A new type of lemongrass, which is a clonal selection from *C. pendulus* (Nees ex Steud. Wats.) has also been evolved. This variety gives higher yield of biomass under adverse soil and climatic conditions and can be used for waste land utilization (17). By using these varieties and new agronomic practices, the farmer can obtain a highly profitable crop of oil in most of the agricultural areas in the north Indian plains and the south. The crop is also suitable for reclamation of waste land and can be cultivated on steep slopes, poor and rocky soils and moderately alkaline soils. It can also be used to control soil erosion by planting the crop on canal banks and steep slopes on the roads.

Table 1

YIELD PERFORMANCE OF DIFFERENT VARIETIES OF LEMONGRASS IN NORTH INDIA*

Variety	Oil content %	Oil yield kg/ha	Citral content %
1. Pragati	0.65	206	87
2. Praman	0.55	232	82
3. Check (OD-19)	0.49	143	87

* J.R. Sharma et al., 1988, PAFAI Journ., 8, 17-19; 10, 13-19.

Table 2

YIELD PERFORMANCE OF DIFFERENT VARIETIES OF LEMONGRASS IN SOUTH INDIA*

Variety	Oil content %	Oil yield kg/ha	Citral content %
1. Cauveri	0.90	365	85.7
2. Pragati	0.74	278	86.3
3. Check (OD-19)	0.52	207	89.2

* Kulkarni et al., CIMAP Annual Report, 1989-90.

Java citronella (Cymbopogon winterianus Jowitt)

The plant was introduced in India in 1962 by CIMAP Regional Centre, Bangalore and indigenous agrotechnology was developed. The crop has been grown in the country for the last 25 years and the country has been producing 400-600 tonnes of oil for almost 20 years. Although the country has been self-sufficient for the last 20 years, it has not been possible for India to export this oil to the world market because of lower yield per unit area and high cost of production. Considerable improvement in agrotechnology has been made in the last 10 years. One of the significant developments is the evolution of high yielding variety by CIMAP. Two varieties namely, MANJUSHA (suitable for north Indian plains) and MANDAKINI (suitable for sub-mountain tracts in north India) were released in 1987 (19). These varieties gave 32 and 60% more oil yield as compared to the best available existing strain from Jorhat (Table 3). Recently, further improvement has been made and a new variety designated as CIMAP Bio-13 has been developed in 1988 through tissue culture (6). The variety is a somaclonal variation and gives 30% higher yield than MANDAKINI and MANJUSHA. In addition to higher yield, the quality of the essential oil of this variety is much superior with high citronellol and geraniol content than any variety available in the world today (Table 4). Considerable work has also been done to improve the agronomic practices like crop geometry, crop rotation, fertilizer requirement and irrigation and weed control (7, 9, 11, 12, 25). Using any of the new varieties and by following the modern agronomic practices the Indian farmers can now get very high yield of citronella oil and can easily enter the world market.

Table 3

YIELD PERFORMANCE OF DIFFERENT VARIETIES OF CITRONELLA AT TWO DIFFERENT LOCATIONS IN NORTH INDIA*

Variety	Lucknow	Pantnagar
Manjushah	469	277
Mandakini	346	338
Check (Jorhat Strain)	288	209

* J.R. Sharma et al., 1988, PAFAI Journ., 9, 13-18.

Table 4

COMPARATIVE YIELD PERFORMANCE OF DIFFERENT VARIETIES OF CITRONELLA AT PANTNAGAR*

Variety	Oil yield ka/ha
CIMAP Bio-13	389
Mandakini	317
Check (Jorhat Strain)	250

* A.K. Mathur et al., CIMAP Annual Report, 1987-88.

*Palmarosa (*Cymbopogon martinii* var. *motia*)*

Palmarosa oil, obtained from the flowering tops of *Cymbopogon martinii* var. *motia* has been produced in India for more than 90 years. At one time India was the only supplier of good quality palmarosa oil to the world market. However, the oil was produced only from natural growth from forests and the distillation practices were very primitive, the quality as well as quantity of the oil was poor. As such the production of palmarosa oil shifted to Guatemala, Brazil and Indonesia and India has lost its monopoly. These countries have taken the lead too as they are growing palmarosa on farmers' fields and use modern distillation methods. In the last 15 years agrotechnologies have been developed by CIMAP and other institutions and now palmarosa is cultivated on farmers' fields (8, 20). An improved variety of palmarosa designated as TRISHNA has been developed by CIMAP and released to the farmers (18). This variety gives 40% higher yield than the existing commercial strains and the oil of the variety is much superior having higher alcohol content (Table 5). Using modern agronomic practices, it will be possible for Indian to regain its importance in the world essential oil market. This crop is ideally suited for waste lands, marginal soils, moderately alkaline soils and semi-arid areas of the country.

Table 5
YIELD PERFORMANCE OF DIFFERENT
VARIETIES OF PALMAROSA*

Variety	Oil yield kg/ha	Oil content %	Total geraniol %
Trishna	301	0.7	93.9
Check (Commercial Strain)	218	0.38	88.2

* J.R. Sharma et al., 1987, PAFAJ Journ., 8, 21-26.

*Vetiver (*Vetiveria zizanioides* (L.) Nash)*

India has been producing a limited amount of vetiver oil for internal consumption for more than 500 years. The oil of north Indian variety, which is supposed to be superior, has been produced in very primitive copper and bamboo stills from wild growth in Uttar Pradesh and Rajasthan. Both yield and quality of oil has been poor and often adulterated. However, limited amount of oil has been produced on farmers' field in south India where south Indian type of vetiver oil is produced. Work carried out during the last 10 years has shown that the oil content of vetiver is improved if the crop is cultivated in farmers' field instead of being exploited from natural growth. The cultivated roots of North Indian variety contains 0.6-0.8% essential oil as compared to 0.1-0.2% from wild roots. CIMAP has also developed two new varieties from

the North Indian variety, designated as KS-1 and KS-2 both of which produce very high quality oil and the roots contain 0.8 to 1% oil as compared to 0.3% in the wild strain (23). Recently, a new tetraploid strain designated as SUGANDHA has also been developed, which has more than 1% oil in the roots. This crop is also suitable for waste lands especially highly alkaline soils and water logged soils. Using these varieties, farmers can utilize their marginal lands and obtain a profitable crop of vetiver roots in north India. Using high yielding variety and new technology, it will be possible for Indian producers to export this oil to the world market. The oil of north Indian variety is much superior to that available in the other parts of the world.

*Japanese mint (*Mentha arvensis* L.)*

Japanese mint was introduced in India by the former Drug Research Laboratory (now Regional Research Laboratory) in Jammu in 1954 when a few stolons were introduced from Japan. The crop has been cultivated in the country for the last 30 years and the country has been self-sufficient in oil and menthol for the last 25 years. However, production was stagnant and the Indian producers could not export the oil mainly because of very poor yield and high cost of production. This had happened because the original plant introduced in India has low oil and menthol content and growing of this variety for 15 years without any genetic improvement had caused considerable genetic deterioration. The genetic deterioration was so much that by 1978, a large number of producers could hardly obtain any menthol from the Indian oil by chilling because of low menthol and high menthone content in the oil. A programme for genetic improvement of Japanese mint was taken up in CIMAP from 1978. World-wide collection of germplasm was made and finally a bud sport from a Thai strain was selected and further developed by selection. It was released to the farmers in 1983 as CIMAP MAS-1. This variety gives 50% more yield of oil as compared to the existing strain with 80-85% menthol, 65% of which can be isolated by chilling (29). The release of this super-menthol strain has revolutionised the mint oil and menthol production in India. As a result of further work, a better variety designated as CIMAP Hybrid-77 was released in 1985 (Table 6). The new variety is hardy and vigorous, resistant to diseases and gives 25-30% higher yield of oil as compared to MAS1. This variety also gives higher yield of planting material as compared to the variety released earlier. This has further reduced the cost of production. Considerable improvement of agronomic practices has also been made by the Institute as well as other laboratories. As a result of release of the new varieties and use of new methods of agronomic practices, the country is now producing (1, 14, 23) approximately 1000 tonnes of mint oil as compared to 200-300 tonnes produced about 5 years earlier and for the first time India has become an exporter of menthol and dementholisled

Table 6

YIELD OF OIL AND MENTHOL CONTENT OF DIFFERENT VARIETIES OF JAPANESE MINT*

Variety/Strain	Oil yield kg/ha	Oil content %	Menthol content %
CIMAP Hybrid-77	428	0.88	81
CIMAP Mas-1	316	0.77	83
MA-2 (Check)	183	0.55	66

* B.R. Tyagi, CIMAP Annual Report, 1987-88.

oil instead of being an importer of oil of mint and menthol 5 years earlier. This production can be further improved by further organisation of production and marketing and India can become a major supplier of menthol to the world market. At present the total world requirement of menthol is about 4000 tonnes.

Peppermint (*Mentha piperita L.*)

Although peppermint was introduced in India during the British period, it remained as a garden crop till commercial production technology was developed by CIMAP Regional Centre, Kashmir in the early 60s. Agronomic practices have been improved further and it is now possible to grow peppermint in Kashmir, Himachal Pradesh, hills of Uttar Pradesh and sub-mountain tracts of U.P. (13, 24). At present more than 80% of world demand (approximately 3000 tonnes) is produced in the U.S.A. Using the technology developed in this country, it is now possible for Indian growers to produce peppermint at prices much lower than that of U.S.A. and offer it to the world market.

Spearmint (*Mentha spicata L.*)

Although spearmint was introduced in India in the early 50s, both the yield as well as quality of essential oil was poor, with the result that the internal demand was met by import. Farmers did not take up production as the variety which was available gave very poor returns and uneconomical yields. CIMAP introduced a strain of spearmint from U.S.A. in 1978. The introduced strain gave 100% higher yield than existing strain and the spearmint production started picking up in the sub-mountain tracts of U.P. (22). A new improved strain was developed from this parent strain and released to farmers in 1984, designated as MSS-1. This was further improved and the new strain gave 50% higher yield and was released in 1980 designated as MSS-5 (Table 7). At the same time, a collection of Scotch spearmint (*Mentha cardiaca*) was introduced in 1985 and an improved clone was selected from the parent introduction and released as CIMAP MCAS-2 in 1988 (Table 8). As a result of release of these two varieties, the production of spearmint oil has increased considerably and

has gone up to 100 tonnes from less than 5 tonnes in 1980. Our cost of production is very low and yields are very high and it is possible for India to replace U.S.A., which is the main supplier of spearmint oil to the world market.

Table - 7

YIELD PERFORMANCE OF DIFFERENT VARIETIES OF SPEARMINT (*MENTHA SPICATA*)

Variety	Oil yield kg/ha	Oil content %	Carvone content %
CIMAP MSS-5	347	0.59	70.7
CIMAP MSS-1	251	0.55	69.8
CIMAP MS-1	143	0.55	70.0
Check (Control)	33	0.32	70.0

Table 8

YIELD PERFORMANCE OF DIFFERENT VARIETIES OF SCOTCH SPEARMINT (*MENTHA CARDIACA*)

Variety	Oil yield kg/ha	Oil content %	Carvone content %
CIMAP MCAS-2	225	0.53	65.9
CIMAP MCAS-1	124	0.40	58.6

Lavender (*Lavandula angustifolia subsp. angustifolia syn. L. officinalis Chaix. L. vera DC.*)

Lavender is one of the most important essential oils used in high grade perfumes and cosmetics. All the requirement of this oil by the Indian industry is still imported from Europe. Recently, lavender has been introduced in India by CIMAP at its Regional Centre, Kashmir. Indigenous agrotechnology has been developed and transferred to farmers. India has been producing a limited quantity of good quality lavender for the last 5 years (27). Recently, CIMAP scientists have developed a new improved variety of lavender designated as 'Sher-e-Kashmir'. This gives 80% higher yield of oil than the parent Bulgarian variety 'Karlovo'. The oil of this variety is much superior than the original Bulgarian strain because of higher ester value. Our yields and cost of production is such that we can not only become self-sufficient but can export lavender oil to the developed parts of the world if large scale cultivation and processing is organised in Kashmir valley, dry areas of Himachal Pradesh or low rainfall areas of Uttar Pradesh hills. Lavender again is a crop, which grows on poor soil and which can be grown on marginal soils and wastelands, steep slopes in J&K, Himachal Pradesh and Uttar Pradesh.

Clary sage (*Salvia sclarea* L.)

Clary sage oil, obtained from flowering tops of *Salvia sclarea*, is one of the costly oils used in high grade perfumes and cosmetics. Most of the requirement in India is obtained from Europe. During the last 10 years a Bulgarian strain of clary sage was introduced by CIMAP Regional Centre in Kashmir. Necessary agrotechnology has been developed and a limited amount of high quality clary sage oil has been produced in Kashmir for the last 5 years (26). This technology can be multiplied on large scale in Kashmir valley as well as dry areas of Himachal Pradesh and hills of Uttar Pradesh for export of clary sage oil to other countries.

Rose oil (*Rosa damascena* Mill.)

Although rose oil has been produced in India for the last 500 years, both the yield of rose water and rose oil has been very poor. As such the country has not been able to become self-sufficient or export the oil to other countries. This has happened because of primitive methods of cultivation in unfavourable areas and very primitive methods of distillation. Bulgarian rose oil, obtain from *Rosa damascena*, has been considered as superior and preferred in the world market. At present Bulgaria supplies more than 80% of the total world demand (approximately 15-20 tonnes) of rose oil to the world market. About 8 years ago, CIMAP scientists introduced a few cuttings of rose from Bulgaria. As a result of intensive research and development carried out during the last 8 years, indigenous agrotechnology has been developed in Kashmir valley and a 4 hectare pilot plantation has been developed at the Institute's farm in Kashmir (28). The Institute has also developed necessary processing technology and a pilot plant has been installed at the Institute's station in Kashmir. About 3-4 kg. high quality rose oil has been produced and sold to the industry for the last 4 years. Both yield of rose oil as well as oil content is much higher in India as compared to Bulgaria and the cost of production of good quality rose oil in Kashmir is much less as compared to Bulgaria. If properly utilized, this technology can be used to make India as one of the leaders in production of rose oil for the world market. Rose again is a plant which can be grown in poor soils and marginal lands which cannot be used for any other agricultural purposes in Kashmir valley.

Future prospects

As discussed earlier, it is apparent that India has the necessary technology which is of world standard and in some cases superior than that available in other countries. However, most of the technologies have been used to a very small scale, with the result that although the country has become self-sufficient in a number of essential oils, we have failed to make any impact in the world market and increase our ear-

nings from export. In spite of all these developments of science and technology of essential oil plants, the Indian export has been going down progressively mainly because of decrease in export of lemongrass and sandalwood oils. In certain areas like eucalyptus, spearmint and Japanese mint some beginning has been made for export. However, the quantity exported is so small that it does not make any significant impact on the Indian economy. This has happened because no efforts have been made to organize the production on large scale and safeguard the interests of the farmers. Most of the traders in essential oils are small businessmen who have been exploiting the farmers by offering very low or uneconomical prices, with the result that production has remained stagnant and farmers are not very enthusiastic about taking up cultivation of essential oil plants. This situation can be improved only if the production is organized either by public sector agencies in each state or large and reputable private concerns who operate on the pattern of sugar production. The industrialists should take due interest in production of raw materials and Government should provide support-price to the farmers. In case of essential oils, the Government has to take further interest in purchasing the oil and also export it to other countries, so that the growers are not exploited by the small traders.

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QUALITY LABORATORIES SCIENTIFIC INSTRUMENTS

Autoclaves

Baths (Water, Oil, Viscosity, Low Temp.)

Colorimeters

Furnaces

Incubators

(Bacteriological, B.O.D.)

Micro-Litre Syringes (for G.C. & H.P.L.C.)

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Acrylic lacquers as top coat for leather

R. PRABHU

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Introduction

Leather finishing uses solvent based systems predominantly as top coat. Solvent lacquer based on nitrocellulose (NC), cellulose acetate butyrate (CAB) and polyurethane (PU) are widely used in leather finishing operations. The utility of acrylics in leather finishing has been established in impregnation through base coats for many years. Acrylics of all synthetic polymers are noted for their transparency, resistance to water, dilute acids and alkalis, weather resistance, excellent adhesion, print retention and flexibility. The acrylic film is internally plasticized through different monomers in contrast to NC film which contain external plasticizer. Therefore, plasticizer migration in the case of acrylic film is absolutely nil.

The present study deals with the preparation of acrylic polymers in solution and use of these polymers as top coat on leather. This work consists of:

- a) Preparation in solution of butyl acrylate-methyl methacrylate copolymers and methyl methacrylate/ethyl acrylate/methyl acrylate terpolymers of different compositions and glass transition temperatures (T_g).
- b) Use of these polymers as top coats on leather and evaluating their properties.

Experimental

Raw Material

Methyl methacrylate, ethyl acrylate, butyl acrylate, methyl acrylate (all of commercial grade) were used as such without further purification.

Benzoyl peroxide (E. Merck) and solvent toluene (LR grade) were used as such.

Preparation of the polymers

The apparatus consists of a three necked flask through the centre of which passes a mechanical stirrer, through the second a reflex condenser and a dropping funnel for monomer addition through the third. The flask was thermostated at a temperature of $80 \pm 2^\circ\text{C}$. About a gram of benzoyl peroxide was dissolved in the required amount (230 grams) of toluene and were added to the flask with stirring. The mono-

mer mixture (100 gms) was added to the flask through the funnel over thirty minutes, and after addition was over, about 0.1 gm of the initiator dissolved in the solvent was added to the flask and polymerization was allowed to proceed for 12-13 hours. The completion of polymerization reaction was tested by studying film forming characteristics of the polymer solution. Different monomer compositions with T_g 's ranging from 15°C to 25°C used in polymer preparation are given in Table I and II. In all the cases the solid content of the polymer solutions was adjusted to 30%.

Table 1
CHEMICAL COMPOSITION OF THE SOLUTION

Sl.No.	Monomers in gms			$T_g^\circ\text{C}$
	MMA	BA		
1	35	65		+ 15
2	32.5	67.5		+ 20
3	30	70		+ 25

Table 2
CHEMICAL COMPOSITION OF THE SOLUTION

Sl.No.	Monomers in gms				$T_g^\circ\text{C}$
	MMA	MA	EA		
1	23	67	10		+ 15
2	29	61	10		+ 20
3	35	55	10		+ 25

Applications of the polymers as top coats on leather

Raw Material: Ready to top pigmented cow upper.

Top coat: Experimental product -- 1 part
Toluene -- 1 part

The above mixture was sprayed on the leather one full cross coat, dried and plain plated. The same procedure was repeated for all the other polymer solutions.

Results and Discussion

The leather industry is at present using nitrocellulose lacquer as a top coat for finishing all types of upper leathers. The major disadvantage of nitrocellulose finish is that the finished leather on storage develops light yellow colour and further the finish cracks on folding which is due to migration of plasticizer to the finished surface.

To overcome this, lacquers based on acrylics are formulated. Acrylic film is known for its transparency, clarity, flexibility and weathering properties. In the acrylic formulation, the plasticisation is done internally by the copolymer itself thereby eliminating the addition of external plasticizer. The only property which has to be taken care of in acrylic formulation is that the finished film should withstand hot ironing at 50-60°C. By choosing the desired monomers and glass transition temperature of the copolymer, the film characteristic of the copolymer can be fixed. Copolymer with higher Tg (25°C) which is nearer to room temperature will give film which will be hard and thermally more stable. Incorporating methyl methacrylate which is supposed to give hard polymer film, in the formulation of copolymer will greatly improve the strength properties of the film with respect to tack, hardness etc.

Acrylic copolymer based on MMA-BA having Tg 15, 20 and 25°C were made and the properties of the finished film on leather are given in Table 3. Similarly acrylic terpolym-

ers based on MMA-EA-MA having Tg 15, 20 and 25°C were made and the properties of the finished film on the leather are given in Table 4. It is clear from the data that in both the cases the formulations having Tg 25°C (product C and product F) gave good results with respect to gloss, tack, flexibility, abrasion and wet and dry rub fastness. Products with Tg 15°C (product A and product D) were found to be very tacky and product with Tg 20°C (product B and product E) had a moderate tack. From the observation it is clear that with increase in Tg there is decrease in the tackiness of the film.

Conclusion

From the present work, product C and product F were found to be good top coat finishes for leather. With respect to plating properties in both the cases, the finished films could be plated at 50°C without any damage to the film surface. However, very little pressure was applied for plate release in the case of light leathers.

Table 3
EVALUATION OF THE TOP COAT ON LEATHER -- MMA-BA COPOLYMERS

Polymer Soln.	Tg °C	Gloss	Tack	Flexibility	Abrasion	Wet & dry rub fastnes
A	+ 15	Medium	Tacky	Good	Fair	Good
B	+ 20	Good	Moderate tack	Good	Good	Good
C	+ 25	Very good	No tack	Good	Good	Good

Table 4
EVALUATION OF THE TOP COAT ON LEATHER -- MMA-EA-MA TERPOLYMERS

Polymer Soln.	Tg °C	Gloss	Tack	Flexibility	Abrasion	Wet & dry rub fastnes
D	+ 15	Medium	Tacky	Good	Fair	Good
E	+ 20	Good	Moderate tack	Good	Good	Good
F	+ 25	Very good	No tack	Good	Good	Good

Please watch out for

SUPPLEMENT ON LEATHER PROCESSING
in this issue
and
last issue of every month

INDIAN LEATHER NEWS

RS. 3,400-CR TARGET MAY BE ACHIEVED

The eighth five year plan target of Rs. 3,400 crore for leather exports is likely to be achieved in the second year of the plan itself (1991-92) and by the end of the decade, leather exports hold the potential of touching a level of Rs. 10,000 crore.

Inaugurating a seminar on "Finance for Leather Industry" during the eighth plan period on October 12, Mr. K.N. Ardhanareswaran, special secretary, Ministry of Commerce, said the leather industry in India must modernise if it had to stay in the forefront as an export sector.

He said the leather industry is an important source of export earnings and as well as a significant source of employment in the rural areas.

Modernisation and development of professional skills through training must be a continuous process to enable the industry to adapt to the fast changing trends in fashion and design, he added.

Mr. Ardhanareswaran said the commerce ministry was in favour of having a second look at the existing bank lending norms which were fixed sometime ago and making them more liberal.

He suggested that while considering applications for finance, it would help immensely if the financial institutions could process such cases on the basis of the need and the overall viability of the project rather than credit worthiness of the party.

He stressed the need to tap India's vast resource base by improving the facilities for retrieval and processing of

leather. Mr. M.M. Hashim, Chairman, Council for Leather Exports, in his address said the council had made a proposal to the Government for the creation of a Rs. 400 crore modernisation fund to assist industry to modernise itself in a short time.

Responding to this, Mr. Ardhanareswaran indicated that the Commerce Ministry would fully support the proposal and urged the banks and financial institutions to come forward to fund it.

Total exports of leather and leather products from India stood at Rs. 2,300 crores during 1989-90 and is likely to touch Rs. 2,800 crores during the current year 1990-91. The global scenario also indicates that it would be possible to maintain a growth rate of 30 to 40 per cent in leather exports during the eighth plan.

Mr. P. Prabhakaran, executive director, Council for Leather Exports, however, pointed out that inspite of this impressive growth, India's share of the global trade in leather amounted to only 3.5 per cent.

He urged that fresh policy initiative would be needed especially in financing to push up exports further in the coming year. The share of footwear in particular needs to be improved.

LEATHER GOODS EXPORT HIT BY FRG BAN ON USE OF PENTACHLOROPHENOL

Leather products exports to Germany have come to standstill following a ban by the Germany Government on the import of leather and leather products treated with pentachlorophenol (PCP).

PCP, which is commonly used by tanners in India, is present in almost all

types of leather products manufactured in the country. Since Germany constitutes the single largest market for Indian leather products, this ban has seriously hampered the exports from the country.

Leather and leather product exports from India to West Germany has gone up from Rs. 70 crore in 1985-86 to over Rs. 371 crore in 1989-90. However, with the imposition of the ban, exports during the current year have dropped considerably.

Under the ban, every invoice from India has to be accompanied by a declaration from the exporter that the shipment in question is free of PCP or within tolerance limits. Since there is no internationally accepted standard for testing the presence of PCP in leather products, this has put exporters in a quandry. Recently, however, a standard acceptable to the Germans has been developed by PFI, FRG.

The Central Leather Research Institute has imported testing equipment but it is not sufficient to meet the requirements of the entire exporting community. Officials at the CLRI have reported that a large number of samples were already pending with the Institute for certification.

The Indian Leather Products Association (ILPA) has appealed to the Union Government to install such testing facilities all over the country. This, according to the ILPA president, Mr. R.K. Srivastava, would help exporters expedite their export commitments.

ILPA has also urged the Union Government to request Germany to defer the imposition of total ban at least for a year in order to enable the exporters to switch over to PCP-free products gradually. At present the industry has a stock of

wet blues treated with PCP worth Rs. 450 crores.

IMPLEMENTATION ON MINIMUM WAGES: CRISIS IN TAMIL NADU LEATHER UNITS

The leather industry in Tamil Nadu is heading for a serious crisis in the wake of the State Government's announcement fixing minimum wages for leather workers.

The employers, it is learnt, are planning to move the court seeking a stay on the operation of the Government order in this regard. They have also appealed to the Government to keep the implementation of the order in abeyance and reconsider the decision.

The trade unions representing the workers are also not in a mood to come to any kind of compromise on the issue and are vigorously pursuing ways to see that the order is given effect to *in toto*. According to industry sources, the minimum wages as contained in the Government order are 'not related' to the prevailing rates and their immediate implementation will upset the production and export schedules of many units. Some of the small units, doing mainly job works, have already suspended operations, it is claimed.

At the outset, industry circles point out that the committee set up by the Government to look into the question of fixing minimum wages was not 'properly represented' by the employers. This being so, they are not a party to the so-called final report of the committee.

Besides, the minimum wages as fixed now are almost double the existing rates and coming as they do almost out of the blue, will hit the units, mostly the small-scale ones, hard. This apart, the minimum wage of nearly Rs. 1100, including DA, for unskilled workers is far removed from the ground realities

SUPPLEMENT ON LEATHER PROCESSING

as they, most of whom are uneducated girls, do only 'light' work.

Industrialists fear that the 'sudden' development would affect long-term pending contracts with no scope for adjusting the increase in wages against the prices. In the event, exports will be the worst hit with the projections on the front more than likely to go awry.

Trade union sources, however, give a lie to the arguments of the employers.

They refute the allegation that the employers were not represented on the committee. On the contrary, a couple of their representatives did sign the final report, they contend.

On the 'grave' implications of the Government decision, the union leaders point out that the increase in wages is only a fraction of what the industry has been earning by way of exports. As a matter of fact, exports have gone up more than four-fold over the last five years to reach nearly Rs. 2000 crores in the current year.

The industry has long been exploiting the 'cheap labour' situation in the country and building up own fortunes without giving the workers their due. Even at the current rates, the wages are much below the minimum levels laid down by the International Labour Organisation (ILO), note the leaders.

ARUNA LEATHERS TO BE MERGED WITH MRF

The Board for Industrial and Financial Reconstruction (BIFR) proposes to merge Aruna Leathers and Exports Limited with the tyre giant, MRF Limited. The merger will be effective from January 1, 1990.

According to a draft scheme prepared by the board, MRF will have to make a lumpsum payment of Rs. 225 lakhs to the Indian Bank as liabilities. The Indian Bank will use the amount for full

payment of the statutory liabilities including those disputed, 50 per cent of sundry creditors, full provision for disputed claims of the STC and export import bank.

The balance will be retained by the Indian Bank as one time settlement of all their dues from Aruna Leathers and Exporters Limited and the bank would also not provide any further assistance to Aruna Leathers after the merger is officially effective.

In order to ensure viability of Aruna Leathers as a division of the MRF after the merger becomes effective, the installed capacity of the company will be enhanced by making an investment of Rs. 110 lakhs over a period of three years. MRF would also bring in Rs. 75 lakhs in the first year of implementation of the scheme to finance cash losses working capital margin and capital expenditure.

Inspite of the fact that the share value of Aruna Leathers has dropped to nothing, the mother company (MRF) is prepared to offer one fully paid equity share of MRF Limited in exchange of 10,000 equity shares of Aruna Leathers. It will also pay the SIPCOT dues from 1995:

Notification from the BIFR said that the transferee company will be entitled to the benefits under Section 72a of the Income Tax Act, 1961. Moreover, the provisions of the Section 41(1) of the Act shall not apply to any remission or liability granted by any parties under the scheme.

It said that the MRF Limited will also be eligible to carry forward the unabsorbed investment allowance of Aruna Leathers in terms of the Section 32 A (ix) of the Act. The employees of the transferring company shall also become employees of the transferee company on the same terms and conditions as are applicable immediately before the merger takes place.

BILT TO ACQUIRE TOSCANA SHOES

The Ballarpur Industries Ltd., (BILT) of the Thapar group, is acquiring a shoe upper making unit called Toscana Shoes Ltd.

The proposed take-over will be effected through acquisition of the shoe company's fresh equity shares.

Toscana is issuing 655,900 equity shares of Rs. 10 each and the Thapars are buying 99.38 per cent of the proposed equity. The investment will be made from internal accruals.

The Ballarpur company is engaged in the manufacture and sale of ordinary and superior varieties of writing, printing, industrial and speciality papers, exercise books and fancy stationery items, vanaspati, containers, caustic soda, chlorine, sodium tripolyphosphate, salt, bromite/bromide, shipping agency business and exports.

BILT had already obtained government approval for the establishment of a new undertaking of the investee company (Toscana Shoes) and also a letter of intent in its own name for Toscana which was set up to manufacture shoe uppers and full shoes for export.

BILT had pleaded before the appropriate authorities at New Delhi that the take over of the shoe company was aimed at increasing the group's exports. The government's policy is also in favour of large house showing better export performance in view of serious BoP situation.

The takeover of the shoe company by a giant unit like BILT does not contravene the current licensing for leather footwear and leather goods.

Meanwhile, the government has cleared another Thapar group company's proposal for going in for more tex-

tile items under the fuller flexibility scheme introduced by the Centre in 1986, for the use of fibres.

JCT Ltd. another company of the Thapar group has drawn up plans for the manufacture of various items covered under entry No. 23(1) and 23(5) of the first schedule to the IDR Act in respect of its licensed capacity of 60,000 spindles, 1239 looms and 524 waste spindles for the manufacture of yarn and cloth at its existing undertaking at Kapurthala in Punjab. No additional investment is envisaged under the proposal.

The government told the company that it shall not shift any capacity from its existing location nor increase the already existing approved capacity. It would also not manufacture any items reserved for exclusive development in the small scale sector.

DRI MOVE UPSETS LEATHER EXPORTERS

A different interpretation of a metallic embellishment by the Directorate of Revenue Intelligence (DRI) while calculating import duty has landed leather goods exporters in trouble. DRI has interpreted 'buttons', otherwise included in the list of items eligible for concessional rate of duty, as "snap fasteners" thus denying exporters the advantage of a low rate of import imprest.

DRI has stated that certain firms were importing snap fasteners and declaring them as buttons in order to evade customs duty by taking advantage of the notification providing for a concessional rate of duty of 45 per cent on button imports under OGL.

Leather goods exporters have, however, countered the DRI allegations by saying that the notification No: 267/89 dated November 1, 1989 includes buttons comprising four parts; studs, eyelets, sockets and washers — all

independently eligible for concessional rate of import duty.

They also feel that since snap fasteners also include the same four parts, there is no reason why these should be subjected to higher duty simply because of a doubt over terminology of the imported items. Exporters point out that these buttons are mainly imported from West Germany for being used in wallets and handbags meant for exports.

DRI, on its part, says that the imported items are being supplied mainly by a FRG company — Prym-Werke GmbH & Co., KG, Stoleberg — which names its products as fasteners.

NEED TO UPGRADE LEATHER UNITS STRESSED

Mr. Sushil Kumar Shinde, Minister for Urban Development Maharashtra, stressed the need for modernising the leather products industry in the state.

Speaking on the occasion of inaugurating new premises of Council for Leather Exports at Bombay, Mr. Shinde assured all help to set up mini-complexes at Dharavi and Deonar besides a major complex at Thane or Nashik.

It was necessary to set up a major complex where there was sparse population. He regretted leather exports had been declining and said steps should be taken to reverse this trend. Mr. Hashim, Chairman of CLE, assured 50% grant from the Leather Development Fund for leather units in Maharashtra. He urged the members of Small-Scale Leather Industries Federation to form a co-operative to become eligible for this grant.

Mr. Prakash Mahtani, President of Small Scale Leather Industries Federation, explained various steps taken by his body in training leather artisans, in setting up mini and micro leather complexes, etc.

NEWS FROM ABROAD

NATURAL FAT TO POWER HEATING BOILERS

The sheepskin industry could be saving itself a fortune by using natural fat extracted from the skins to power heating boilers. A Somerset member of the Real Sheepskin Association has already acquired the technology to do just that and is offering the knowledge to other members of the Association. Now the fat is being used to replace 20% of the tannery's consumption of fuel oil. The skin grease is being burned cleanly producing steam for other production processes, one of which is the degreasing cycle that recovers the fat in the first place. It is the ultimate natural renewable energy source.

MICROFOAM

Lambati SpA and GeMaTa SpA have developed an innovative microfoam system for use in finishing. It is an environmentally friendly system that still provides high adhesion with a natural film of a smooth texture. There is

no need for surface pigmentation or plastic coating, ensuring transparency of appearance and a soft handle. In comparison to conventional systems, the solvent-free foam base provides a substantially superior covering in one passage (or a maximum of two) even on extremely defective hides with grain faults and heavy growth, veins, scratches or marks.

Microfoam can be applied to any type of leather using a special roller coating machine.

— *Leather* 192 (4583), 1990.

NEW TECHNIQUE TO SAVE CHROMIUM WASTE

A way to recycle chromium waste from leather production which tanneries now ship to landfills is being patented by US Department of Agriculture scientists. To separate chromium from the leather waste, usually the shavings — the shavings are suspended in and heated to 140-145°F for about an hour.

A bacterial enzyme commonly used in laundry detergents is then added to this mixture which is held at the same temperature for two hours. The resulting chemical reaction results in a protein solution and a solid suspension of chromium. The solid chromium can be separated from the protein by filtration or centrifugation.

— *Shoe & Leather News*, (3812), 1990.

HIDE PRODUCTION IN 2000

By the year 2000 hide production in the world will increase by 23 per cent in weight and skin production by 21 per cent, according to the Landel Mills Commodities Studies. It anticipates that most of this growth will occur in Asia and Latin America. Asia's share of world hide production should increase from some 13 percent in 1970 to 24 per cent by 2000. Half this amount will come from India and other countries to experience high growth will be China, Pakistan and the Soviet Union.

— *Shoe & Leather News* (3812), 1990.

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NEW DEVELOPMENTS IN LEATHER PROCESSING

DECHROMING OF WET-BLUE TANNERY WASTE

By order of the Dutch Leather Industry and NOVEM, the TNO Leather and Shoe Research Institute carried out an investigation into the dechroming of wet-blue wastes by means of an alkali-acid extraction process. The objective of this investigation, performed on a semi-technical scale, was to establish the technical and economical feasibility of the process.

The process was aimed at the production of two secondary raw materials: dechromed proteins and chrome. The investigation has been focused on the dechroming of wet-blue trimmings using a drum, similar to a tanning drum, in which a sieve had been installed.

The dechroming of wet-blue trimmings has been found to be possible up to a remaining chromium content of approximately 0.3% based on dry substance. This remaining chromium content is obtained when the process liquors are recycled. Without recycling of the process liquors an even lower chromium content can be obtained, but then the costs for dechroming are doubled.

The process liquors should contain a certain amount of sodium chloride. A process liquor (brine) containing mainly sodium sulphate did not result in a sufficient dechroming. A prolongation of the alkaline treatment during the night increases the dechroming effect more than a prolongation of the acid treatment.

For the alkaline treatment a fresh sodium chloride brine should be used. The costs for chemicals, waste water treatment and discharge levy add up to DF1.120 per ton of wet-blue waste. Based on a feasibility study of Moret

Advice the total treatment costs (including depreciation, manpower etc.) are then estimated to be DF1.600 per ton of wet-blue waste.

Profits can be expected from application of the dechromed proteins in animal feedstuff but the amount of these profits can only be determined by means of feeding trials. In addition to that, the question remains whether the feedstuff industry is ready to accept this secondary raw material anyway.

The main problem for application in animal feedstuff production is the high salt (sodium chloride) content in the dechromed proteins. Yet the protein content, the amino acid composition and the enzymatic degradability are favourable. Application of the dechromed proteins as a base material in glue production results in glue of good quality, but due to the remaining chrome, a part of the glue has a green colour and therefore becomes unsaleable.

The value of the other secondary raw material, the chromium in the produced precipitate (sludge), is negligible. Dechroming of wet-blue shavings according to this alkali-acid extraction process gives problems in dewatering. An alternative dechroming process, in which the wet-blue wastes are thermally destroyed by means of boiling, followed by precipitation of the chromium, seems to offer more perspectives for carrying out further investigation.
(Source: International Council of Tan-
ners).

HEAT PUMP DEHUMIDIFICATION IS THE RIGHT DECISION

Chamberlain Fibres Ltd., Rushden, Northamptonshire, U.K. have achieved

savings of £33,000 a year, improved product quality and increased output by 14% following the installation of eight heat pump dehumidifiers in the drying rooms of their leatherboard manufacturing facility.

Leatherboard, which is used as a raw material by the shoe industry, begins as a slurry consisting of 98.5% water. Following an intermediate drying process, the water content is lowered to about 10% to render the material suitable for shoe components.

Chamberlain Fibres formerly relied on one of two final drying processes (dependant upon board type) to achieve this figure: a drying room where fresh air is inducted through a steam heat exchanger and the resultant hot air is passed over suspended leatherboard to remove the surface moisture before being expelled to atmosphere; vacuum driers which apply around 20 tons pressure to the boards and then use heat from a steam-heated hot water table to remove moisture.

Unfortunately, the company had found that the room driers could not produce a consistent product as they often over-dried to the extent that boards lost around 12% of their specified final thickness.

In addition, drying times varied considerably from winter to summer because of differences in ambient temperatures, while the drying rooms themselves took up considerable space in the company's 20-acre site.

The introduction of heat pump dehumidifiers into the drying rooms has enabled Chamberlain to achieve better control of humidity and provide a closed loop drying operation, which is independent of ambient conditions. T

to run at night and over the weekend, the dehumidifiers have reduced energy costs by 38% per board and have allowed the drying operation to be planned more reliably.

The vacuum drying process has also benefited from the introduction of the

dehumidifiers. Boards can now be presented to the vacuum driers consistently in a half dried state, reducing drying times from 30 minutes to 18 minutes. The success of this drying installation suitably impressed the judges of the 1989 East Midlands Electricity PEP Awards, who voted Cham-

berlain Fibres the category one winner.

The PEP Award scheme is organised by the electricity supply industry to give recognition to manufacturing companies who have improved their business proposition by adopting an electrical process or service.

LEATHER ABSTRACTS

VOLATILE ORGANIC COMPOUND (VOC) IN LEATHER FINISHING,
Logi Schneider, *The Leather Manufacturer*, 108, (5), 12, 1990.

In this paper the author is concerned with air emission regulations and their effect on leather finishing. The major piece of legislation in this area is the new Clean Air Bill. The original Clean Air Bill brought improvements in air quality, but hundreds of areas of the USA still have smog problems bad enough to cause illness and death. A

detailed discussion on Volatile Organic Compound regulations that tanners will be facing in the coming months is presented.

PARTIAL AND OBJECTIVE KERATIN ATTACK BY ACID SOACK-ING, F.H. Oertel and U. Thomson. *Leder & Hunte Markt*, 42, 98, 1990.

The article reports on multiple experiments and their results to solve the sulphide problem in tanneries for ecological interest. In the first part of the report the studies are classified accord-

ing to the principle of '3V', an ecology friendly processing method; first prevention, then utilisation and only finally destruction. It is established that the comprehensive satisfactory solution has not yet been found, but that in each case functional principles are required, which lead to a partial and determined pre-destruction of keratin. Subsequently reports are given about experimental work in this direction. It is possible by dosed acid pretreatment to produce a keratin attack, which simplifies the later main process of keratin removal.

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News From Abroad

NEW SINGAPORE DELRIN PLANT TO OPEN ON SCHEDULE: US \$25 MILLION INVESTMENT SETS NEW STANDARDS

Du Pont's new Delrin finishing facility in Singapore is due to make its first shipment to customers in the Asia Pacific region in as planned. "While we had no real fears about over-running our start up operation dates, it is comforting nonetheless to know we're right on schedule", admitted a company spokesman. "It proves we mean business".

The completion of the Delrin plant marks the start of a new phase in Du Pont's commitment to both existing Delrin customers and potential customers in the fast-growing markets of the region, including Hong Kong, India, Japan, South Korea, Taiwan, and ASEAN.

Representing a substantial investment of US\$25 million, it is Du Pont's latest and the world's most modern Delrin finishing facility. Situated at Singapore's booming Jurong industrial estate, the plant has an annual capacity of 18,000 tons of Delrin acetal resins — "more than adequate to meet the growing demands of the region, right into the 21st century".

All regular grades of Delrin and Delrin II can be produced at the site, for use in a wide variety of metal-replacement applications in the automotive, electronics and consumer goods industries. (glass-filled, teflon-filled and colours will continue to be supplied by existing plants).

A walk through the plant confirms that it incorporates the most modern technology, such as the latest in automatic control systems. But what the observer doesn't see is perhaps more important: more than 30 years of Du Pont know-how in the manufacturing of

Delrin acetal resins is also "built-in". Thus, the new Singapore plant assures its customers will receive a consistently high-quality product in every shipment.

From this correspondent's point of view, it is also significant that Du Pont chose Singapore as its regional location. Besides proximity to the expanding Delrin markets, Singapore offers excellent professional manpower, a good infrastructure and a strong business environment in which to operate.

Additionally, "by locating this much-needed production capacity in such a strategic [to the region] place as Singapore, we can greatly reduce shipping times to our customers", confirmed the spokesman. "It also demonstrates Du Pont's commitment to serve the region better, by shortening the times between order and fulfillment", he added.

The new Singapore plant, with a built-up area of 6,400 sqm, represents a significant portion of the US\$100 million investment that Du Pont committed in 1989 for Engineering Plastics in the promising Asia Pacific region. It will employ about 35 staff, 90 per cent of whom will be Singaporean.

Construction work on the facility has already been completed, and the first test production took place in August. Commercial production is set to follow soon.

£850 MILLION NORTH SEA PROJECT

Marathon Oil UK has announced plans to invest £850 million in developing the East Brae field located some 265 km north east of Aberdeen, eastern Scotland.

The project subject to British government approval, will be the Brae Group's fourth North Sea development and its third major platform installation.

East Brae, discovered in 1980, is a gas condensate field that will use gas cycling, an enhanced recovery method first applied in the North Sea at the North Brae field.

The technique can double liquid hydrocarbons recovery compared to conventional production systems.

Reserves are estimated at more than 300 million barrels of liquid hydrocarbons and 39,600 million cubic metres of gas.

First production is planned for December 1993 and output is expected to peak at more than 100,000 barrels of condensate a day in 1995. Condensate will be transported ashore via the Brae-Forties pipeline to Cruden Bay north of Aberdeen.

Field development will take advantage of the existing Brae Area infrastructure, with injection gas and electrical power supplied from the South and North Brae platforms.

Gas reserves in South, North, Central and East Brae total more than 56,000 million cubic metres, with several additional gas discoveries yet to be developed. Brae gas sales in the UK are expected ultimately to increase to 10 million cubic metres a day.

Detailed design of the East Brae platform is well advanced and fabrication contracts worth more than £100 million are being formulated with UK contractors. Platform fabrication will begin in 1991.

Six of 17 planned development wells (13 for production and four for gas injection) will be drilled before platform installation to allow production to start in 1993.

Installation of the 9,300-tonne jacket will be crane-assisted and require one of the heaviest single lifts ever undertaken in the North Sea.

The gas recycling production technique involves platform processing of the rich, wet reservoir gas by separating dry gas from the liquid hydrocarbons, or condensate.

The separated gas is returned under pressure to the reservoir and the condensate fed into the production pipeline.

The key feature of the method is the recycling of the gas — by re-injecting East Brae gas along with gas transferred from North Brae, the pressure in the East Brae reservoir will be maintained at a high enough level to prevent liquid hydrocarbons condensing within the reservoir rock and becoming consequently unrecoverable.

MRPRA WINS PRI AWARD

The Malaysian Rubber Producers' Research Association (MRPRA) has been awarded the Plastics and Rubber Institute's (PRI) coveted Prince Philip

Award for the development and successful application of natural rubber bearings for earthquake protection of buildings.

His Royal Highness, The Duke of Edinburgh will present the Award for Polymers in the Service of Mankind to Datuk Ahmad Farouk, Chairman of the Board of MRPRA, at a ceremony at Buckingham Palace on Tuesday 6th November 1990.

Professor Saunders CBE, President of the PRI said 'The PRI is delighted to recommend to His Royal Highness the MRPRA's work on natural rubber bearings.

Its potential for saving human life through earthquake protection makes it a most appropriate recipient for the Prince Philip Award for Polymers in the Service of Mankind'.

Datuk Farouk said 'The Association

is delighted to be the recipient of the Plastics and Rubber Institute's Prince Philip Award.

This recognises the fruitful outcome of a research and development programme initiated some twenty years ago. The recognition by this award of the major part played by the Association in the development of natural rubber base isolation techniques for earthquake protection is particularly gratifying since it has been entirely funded by the Malaysian rubber producing industry —mostly small farmers —through the research cess on rubber exports.

It provides ample justification for the policy of the Malaysian Rubber Research and Development Board in continuing to invest heavily in consumer-oriented research, giving Malaysia the lead both in the production and consumption technology of natural rubber'.

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News About New Projects

LUMMUS/TOYO CLINCH INDONESIAN ETHYLENE DEAL

Lummus Crest has won the contract to provide basic engineering for the Indonesian ethylene cracker proposed by local concern Chandra Asri. A contract for detailed engineering has been awarded to Toyo Engineering of Japan.

As more details emerge on the signings which took place earlier in September, industry sources believe the Chandra Asri project at Serang, West Java, is likely to proceed ahead of the competing Shell-backed project at Cilacap, central Java.

Under the contract, Lummus will provide its proprietary SRT short residence time pyrolysis technology for a 550,000 tonne/year ethylene unit. It will also supply processes for a 72,000 tonne/year methyl tertiary butyl ether (MTBE) unit, 90,000 tonne/year butadiene extraction unit, C4-C5 hydrogenation unit and a 360,000 tonne/year pyrolysis gasoline unit.

At the signing ceremony, Chandra Asri president Prajogo Pangestu said downstream development would include units for 450,000 tonne/year of high and low density polyethylene and 100,000 tonne/year polypropylene. An ethylbenzene unit and other downstream facilities are also planned. Capacities and process licensors have still to be finalised.

Union Carbide could offer its Unipol technology for the PE and PP plants: it is already providing technology for Indonesia's first PP plant, a 160,000-200,000 tonne/year unit being built by the Tri Polyta Indonesia (TPI) consortium at nearby Cilegon. The Barito Pacific group, which has a 50% stake in Chandra Asri, also has a 12% stake in TPI.

Lummus is understood to be inter-

ested in providing technology for the ethylbenzene unit. The cracker will be flexible, accepting a wide range of naphthas as feedstock, including LPG and heavy NGLs. Pangestu said Pertamina has agreed to supply 1.8m tonnes/year of naphtha to the complex.

Lummus claims the facility will be one of the most energy efficient in the world. A 35MW gas turbine will be integrated with the cracking heaters. The power produced will meet the total electrical demand of the process units. The complex will be designed to the highest environmental standards: all process streams will either be produced as end-products or recycled within the complex. A spent caustic oxidation unit will treat the waste caustic stream.

The complex will also be equipped with low NO_x burners and decoking will be directed back into the firebox to eliminate particulate emissions. Construction is expected to start as soon as possible with completion set for the end of 1993. The plant is one of three olefins projects licensed by the state.

CARMEL GOES AHEAD

After months of wrangling and litigation procedures, Israel Petrochemical Enterprises (IPE) and the Oil Refineries have signed an agreement to go ahead with their joint venture, Carmel Olefins. The move should allow progress on Israel's first polypropylene plant, originally proposed in 1986.

The joint venture terms call for Oil Refineries' ethylene plant and IPE's polyethylene plant to be merged as Carmel Olefins. The principal aim of the collaboration is to build a 60,000 tonne/year polypropylene plant at a cost of \$80m. To avoid further delays in implementing the project, Israel Petrochemical Enterprises and Oil Refineries have agreed to let Haifa Technion's president serve as an arbitrator in any future disagreements.

JOHN BROWN FOR ICI

John Brown has confirmed it has been awarded an ¥80m (\$154m) contract by ICI for the expansion of the methyl methacrylate (MMA) plant at Teesside, UK, and the installation of a sulphuric acid recovery unit.

The recovery unit includes a process developed by the Acid Technology Divisions (Toronto) of Chemetics International, the former ICI subsidiary, now owned by John Brown. John Brown's Portsmouth office will carry out the engineering, procurement and construction of the MMA plant. Chemetics will undertake the engineering and procurement of the sulphuric acid recovery section of the project.

The project, which at ¥110m represents ICI's largest single investment in the UK in the last 10 years, will double its MMA capacity in the UK and eliminate disposal of acid waste to sea.

THAIS PLAN THIRD PETRO-CHEM UNIT

As part of its southern seaboard development programme, Thailand is studying plans for a third petrochemicals complex along the same lines as its second complex now going ahead at Mab Ta Pud, Rayong province.

The complex, which could open by the end of the decade, would be integrated with a 300,000 barrel/day oil refinery and natural gas separation plant planned for Nakhon Si Thammarat. A pipeline to bring natural gas from the Gulf of Thailand to Khanom, Nakhon Si Thammarat, is for completion in 1994. Plans call for the ethane and propane extracted from the natural gas to feed an olefins plant, naphtha from the refinery would be supplied to aromatics units. Much of the output would be exported. The viability of the gas separation plant is now under investigation by the Petroleum Authority of Thailand.

INTEROX UPS H₂O₂

Interrox, the Solvay/Laporte joint venture, is to increase its hydrogen peroxide capacity at Jemeppe, Belgium, and Torrelavega, Spain, to meet growing European demand. Capacity will be raised by a total of 20,000 tonne/year during 1991.

The company earlier announced a 28,000 tonne/year expansion of its Longview, Washington plant, raising total US capacity to 100,000 tonne/year. European capacities are not disclosed.

REPSOL AWARDS TARRAGONA CONTRACT TO LINDE

Repsol has begun construction work on an expansion of its complex at Tarragona, Spain. Linde has been awarded the expansion contract for the cracker it originally designed.

The expansion will increase the cracker's capacity from a present 363,000 tonne/year to 462,000 tonne/year, due to start up at the end of next year or early 1992.

Repsol has confirmed that it is considering expansion of other units at Tarragona, but has not yet come to a decision. Meanwhile, as expected, Phillips Petroleum has finalised a contract to provide the process technology for the Algerian high density polyethylene plant proposed by the Enip/Repsol joint venture Polimet.

The 130,000 tonne/year plant, to be built at Skikda, is to receive credit support from the Export-Import Bank of the US. The venture has already won approval from the Conseil de la Monnaie & du Credit and is expected to be established soon.

Enip, the petrochemicals subsidiary of state energy company Sonatrach, is working on other projects. It has recently issued tenders for a 20,000

tonne/year formaldehyde plant and units at the Arzew methanol and synthetic resins plants. Bidders are expected to provide buyer or supplier credits.

Enip is also understood to be in preliminary negotiations with Repsol to set up an ethylene cracker at Arzew. Engineering studies are expected to begin later this year.

Earlier proposals between Enip and Indian Petrochemicals Corp. Ltd. (IPCL) and Engineers India to establish a joint venture petrochemicals complex at Arzew and revamping work at Skikda seem to have stalled.

Problems have emerged about the costing of the Arzew project and the performance guarantees demanded by Enip for Skikda.

DU PONT COMPLETES HFC PLANT

Du Pont has announced mechanical completion of its first commercial HFC 134a plant at Corpus Christi, Texas. Commercial quantities of the non-ozone-depleting CFC alternative should be available for distribution by November. In the meantime, the company is supplying test quantities from its pilot plant facility at Ponca City Oklahoma.

The new plant, which represents an investment of around \$30m, is part of Du Pont's \$1bn-plus, 10-year programme to commercialise a range of CFC alternatives.

The company announced authorisation of funds to design four other HFC plants, including a second HFC 134a facility at Corpus Christi, this summer. Du Pont claims that the four plants could satisfy most world needs for HFC refrigeration applications until the end of the decade.

Meanwhile, ICI, Du Pont's leading contender in the race to commercialise

alternatives, says its first commercial-scale HFC 134a plant, at Runcorn, northwest England, is already well into commissioning, mechanical construction having been completed some two months ago. A formal start-up announcement is expected soon.

LAPORTE HF PLANT FOR THAILAND

Laporte (Thailand) is to invest Baht 200m (\$8m) in a new hydrofluoric acid plant at an industrial complex in Mab Ta Pud, south of Bangkok. Construction of the plant, which has been approved by the Thai Board of Investment, has begun; it is scheduled to come onstream by January 1992.

Key applications for the hydrofluoric acid will be in the extraction of metallic element, tantalum (which is used to produce electronic components), and in the steel, glass and metal extraction industries. Raw materials for the product, including fluorspar, are indigenous to Thailand.

Laporte plans eventually to manufacture other products at the plant. The company's existing interests in Thailand include the joint ventures, Peroxythai and Asian Bleaching Earth, as the company has been allocated enough land to allow expansion.

PDVSA PLANS MAJOR NEW REFINERY

Petroleos de Venezuela (PDVSA), the Caracas-based state oil company, is planning to construct a major new refinery to process heavy and extra heavy crude oils, possibly in collaboration with overseas investors. Planners are currently working on a proposal for a 200,000 barrel/day facility, primarily to refine conventional crudes. PDVSA is still involved in discussions with Mitsubishi Corp on the formation of a joint venture to build and operate a methanol plant and a natural gas complex.

Environment

DU PONT/P&G TO RECYCLE HDPE

Du Pont in Canada and Procter & Gamble (P&G) have drawn up an agreement to back up supply of virgin hdPE with recycled material to be used initially in the manufacture of bottles for containing cleaning fluid. Waste hdPE bottles from kerbside recycling programmes in Toronto and Montreal are being collected by Du Pont in a joint venture with WMI Waste Management of Canada. These will be shipped to two US plants in Chicago and Philadelphia, where they will be cleaned and flaked before returning to Du Pont's Sarnia, Ontario, plant for pelletising.

The first customer for the recycled hdPE will be P&G's bottle supplier, Plax of Burlington. Plax will produce three-layer bottles for P&G's Spic and Span cleaning fluid, which will at first comprise 25% by weight of recycled

material, with an ultimate target of 50%. Commercial production of recycled bottles is expected shortly.

Procter and Gamble estimates that it will eventually divert 18m bottles annually to recycling, saving 1000 tonne/year of non-biodegradable landfill in Canada. A cleaning and flaking facility will be set up in Canada when volume justifies one. Du Pont is seeking more customers for similar recycling programmes.

TAMPELLA EXHIBITS LIFAC PROCESS

The Finnish company, Tampella, based in Tampere, is installing a demonstration unit of its Lifac flue-gas desulphurisation plant at the Poplar River thermal station owned by Saskatchewan Power in Canada. In the process, powdered limestone is injected into the upper portion of the boiler furnace to produce calcium oxide. This then reacts in a spe-

cially designed vessel with sulphur dioxide in the flue-gas to form a calcium sulphate powder that is easily separated from the flue-gas. Tampella claims Lifac is cheaper to install than scrubbers and is readily applicable to any type of boiler. If the demonstration unit is successful, Saskatchewan Power will install Lifac in its new Shand thermal plant.

LURGI SPANISH UNIT

Lurgi Espanola, the Spanish subsidiary of Lurgi, the West German engineering company, has received a turnkey plant for wastewater treatment and sludge incineration for Antibioticos in Leon, Spain. The company's Frankfurt arm will supply the technology and carry out planning for the facility, due to go onstream at the end of 1991. Lurgi will also supply emission control equipment. Lurgi (UK) has received an £8m (\$15.2m) contract to build a sludge dehydration and incineration plant for Yorkshire Water.

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Biotechnology

US/EC BIOTECH TASK FORCE SEEKS MUTUAL BENEFITS

The first meeting of the joint European Community/US biotechnology research task force took place on September 10-11 in Washington DC. The initiative follows an agreement signed recently by EC Commission vice-president Filippo Maria Pandolfi and Dr. Alan Bromley, assistant to the US president for science and technology. Its chief aims are to boost biotechnology research and improve information exchange and cooperation between the EC and the US in this sector. The first meeting focused on two main areas where there is particular scope for collaboration: bio-data banks containing information related to genome analysis; and the development of in-vitro tests for use in biological and pharmacological studies. It was opened by the US secretary of state of agriculture, Clayton

Yeutter, and Bromley. For the first year, the task force is being chaired by Charlie Hess, assistant secretary for science and education at the US Department of Agriculture. Paolo Fasella, of the EC Commission's science R&D directorate will take over this position in a year's time. A second meeting of the task force is scheduled for July next year; approximately two meetings per year are envisaged.

The international competitiveness of the European Community's biotechnology industry 'has been jeopardised by the absence of a coherent policy towards this sector', according to a recent report. Published by the Club de Bruxelles, Bio-industries: What future in Europe? reviews the major sectors of the regulatory framework in the EC, together with existing action programmes. The report concludes that the EC Commission must ensure that biotechnology innovations are given adequate protec-

tion, and that European companies are not tempted to move to locations outside the EC. 'A rapid response must also be found to certain ethical questions and to problems related to protection of the environment'.

UN WRITES GLOBAL BIOTECH GUIDE

Four United Nations agencies are currently compiling a global training manual for organisations using genetic engineering techniques, to be issued by the UN International Centre for Genetic Engineering (ICGEB). The manual will be targeted particularly at science-based industries in developing countries; one of its main aims will be to boost public confidence in the safety aspects of biotechnology. The training manual will be compiled by a scientific working party on biotechnology safety, with members from the UNIDO, the UNEP, the FAO and the World Health Organisation (WHO).

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News From Japan

HOECHST JAPAN, TOKUYAMA SODA PLAN JOINT BUILDER VENTURE

Hoechst Japan Ltd., and Tokuyama Soda Co., have agreed on inauguration of a joint venture for "SKS-6" layered silicate. They are scheduled to soon establish a joint company and build a 20,000-t/y plant at Tokuyama Soda's Tokuyama factory with start-up slated for 1992.

SKS-6 is a new-type detergent builder developed by Hoechst (W. Germany) in 1983. The product is superior to zeolite — widely used as detergent builder — in trapping metal ions and benign to the environment since it is soluble in water. In addition, it shows alkaline reaction, has very good buffering properties and can be used in combination with bleaching agents as well as the conventional builders now in use.

Hoechst Japan — together with major domestic detergent producers — has hitherto conducted assessment tests on SKS-6 and has gained confidence with regard to application of the product to detergent production. Hoechst of W. Germany is operating SKS-6 plants (combined capacity: several thousand tons a year) in W. Germany and France.

1ST VOLUNTARY GUIDELINE FOR BIOREACTORS ESTABLISHED

The food-industry bioreactor-system technology research association has worked out a voluntary standard for quality evaluation of bioreactors and made it effective among the member companies of the association.

Attaching importance to the quality and safety of new-technology-applied products and equipment, the guideline stipulates the evaluation of: (1) materials (foodstuffs) to be used for bioreac-

tors and components of bioreactors; (2) operation control of bioreactors; and (3) products from bioreactors. It also specifies cases where the safety of materials and products needs to be examined and also those where toxicity tests have to be made. It is the first time in the world for a guideline for bioreactors to be established by a business association.

The association in which 54 companies involved in this field are participating was started in 1984, under the support of the Ministry of Agriculture, Forestry and Fisheries to promote technology associated with bioreactors and bioreacting systems. The guideline is based on the association's thinking on the problems it has faced through its activities since it was established.

It is likely that the guideline will be adopted as the official one by the Ministry of Health and Welfare which has been preparing to work out guidelines for biotechnology-applied foodstuffs and bioreacting systems.

The voluntary guideline stipulates that materials to be used for a bioreactor be components of food products that are not in any way out of the ordinary and covered by the Food Sanitary Law. Safety examination needs to be made for any foods that are out of the ordinary and new-type components of food products which have not been authorized must not be used, it also specifies.

MIDEAST UNREST TO RAISE OLEFINS PRICES IN JAPAN

The Japanese oil industry raised prices for oil products in mid-September, keeping pace with rapid hikes for crude oil and oil products triggered by the political turmoil in the Middle East. The domestic petrochemical industry is also scheduled to raise market prices for olefin and polyolefin probably by ¥25/kg in each case, effective with October 1 and October 21 shipments, respectively.

Olefin prices are usually fixed on the basis of the average price of naphtha at the end of every quarter of the year. This time, however, the industry intends to set it in advance with supplementary items added thereto: they are aimed at dealing with the drastic price fluctuations for naphtha.

Since Iraq's invasion of Kuwait on August 2 naphtha prices have continued to rise sharply and have now reached \$340/t, though they once temporarily moved down. Unlike during the two oil crises experienced in the past, prices for oil products — naphtha in particular — have been raised throughout the world by a larger margin than in the case with crude-oil prices. This is because world petroleum trade has been shifted from crude oil to oil products.

The boycott of Iraqi and Kuwait crude oil has seriously damaged Japan's petrochemical industry, which largely depends on Kuwait having an oil-refining capacity equivalent to that of Nippon Oil Co. — Japan's largest oil refiner.

In addition, the industry has also been hard hit by a switch of imported naphtha from Kuwait products to Saudi ones containing less aromatic fractions than the former.

The polyolefin industry envisages passing increased production costs on to product prices but may meet strong opposition from some users since price negotiations were only just agreed on in late August.

BRISTOL-MYERS SQUIBB TO MERGE FOUR JAPANESE FIRMS

Bristol-Myers Squibb Co., has announced that it merged its four Japanese subsidiaries on September 26. The four companies — Bristol-Myers K.K., Squibb Japan Inc., Bristol-Myers Research Institute K.K., and Zimmer Japan K.K. — were merged to create a

create a new company, Bristol-Myers Squibb K.K., the parent company says. The new firm will have annual sales of some £55 billion. Bristol-Myers Squibb the world's 2nd largest pharmaceutical concern, was formed last October as a result of a merger between Bristol-Myers Co. and Squibb Corp.

NIPPON PET'CHEM. TO PRODUCE NONWOVEN FABRIC IN U.S.

Nippon Petrochemicals Co., Ltd. has announced plans to strengthen ties with the Amoco Group of the U.S. As a first step, Nippon Petrochemicals and Amoco Fabrics and Fibers Inc., a wholly-owned subsidiary of Amoco Chemical Co., will equally fund the establishment of a joint venture company to produce "Claf" (nonwoven fabric).

The two will invest \$20 billion to construct a plant inside Amoco Fabrics and Fiber's Roanoke, Alabama factory site, capable of turning out 140 million sq.m. of Claf per year.

Nippon Petrochemicals is also drawing up plans to construct full-scale compound facilities for producing liquid-crystal polymers, which the company is now importing from Amoco Chemical and marketing in Japan. The Japanese firm is studying a more multi-faceted business relationship between the two companies, and one to be fostered on a global scale.

DAICEL CHEMICAL TO CONSTRUCT POLYSTYRENE PLANT AS LATECOMER

Daicel Chemical Industries, Ltd. is scheduled to build a 50,000-t/y polystyrene (PS) plant in Himeji, Hyogo Prefecture in 1982, by introducing a continuous bulk-copolymerization process from Chevron Technology Co. (U.S.). The company will become the 10th PS producer in Japan, showing up in this field for the first time in 20 years.

Raw-material monomer will be bought from domestic firms to begin with.

The new plant will turn out general-purpose and high impact-grade PS on an equal-volume basis. Annually about 20,000 tons of the resin will be supplied to outsiders and the balance of 30,000 tons will be marketed in the form of molded products. The company aims to attain annual sales of ¥13,000 million two years hence.

The said process has already been employed by Huls (W. Germany), Nippon Steel Chemical and Dainippon Ink and Chemicals. Chevron Chemical also has a plant (capacity: 220,000 t/y) base on the same process, which is rated highly for producing PS containing only a small amount of styrene monomer and reducing production costs through continuous plant operation.

Daicel Chemical has hitherto tackled special styrenic-resin operations including those for ABS resin, polymer alloy and engineering plastics. It has decided to launch into versatile-PS business in a bid to build up synthetic-resin operations.

The company's affiliates buy PS and convert it into molded products. By building the new PS plant, Daicel Chemical intends to help them enhance their cost competitiveness and streamline marketing activities.

Japan's PS demand is projected to attain annual growth of 5-6%. In particular, flame-retardant PS is expected to grow at a fast pace. PS consumption by the Daicel group of firms stands at 4,000 tons a year and synthetic resins account for 40% of their combined sales.

NIPPON STEEL CHEMICAL TO INVEST IN TOHTO KASEI

Nippon Steel Chemical Co. and Tohto Kasei Co. have agreed to tie up comprehensively with each other. The former is scheduled to invest in the latter

and the latter's subsidiary, Sento Kasei Co. thus becoming their largest shareholder.

Nippon Steel Chemical plans to start producing bisphenol A next spring. Tohto Kasei is a major producer of epoxy resin, a large outlet for bisphenol A. The business tie-up will help Nippon Steel Chemical establish a thorough-production/marketing system covering from BTX and bisphenol A to epoxy resin.

Tohto Kasei will be able to ensure steady supply of bisphenol A and build up its relationships with the Nippon Steel group, a large consumer of epoxy resin. In addition, it will also be able to count on the group's financial help when stepping up overseas operations in Southeast Asia.

M'BISHI PETROCHEMICAL BRANCHES OUT INTO SUPER-ABSORBENT POLYMER

As part of its policy for consolidating and strengthening acrylic-acid business Mitsubishi Petrochemical Company, Ltd. is to industrialize the production of superabsorbent polymer. The company will construct a 10,000-t/y plant for superabsorbent polymer at its Yokkaichi factory (Mie Prefecture) with operational start-up scheduled for the autumn of next year at a cost of about ¥3 billion.

The company will expand the production capacity of its plant for acrylic acid and acrylic ester to satisfy increased demand for these products and is constructing a 110,000-t/y plant for them, the largest in the world as a single unit, with completion scheduled for mid-1991. (Upon completion, operation of the present 50,000-t/y plant will be suspended).

As part of this plan, the company will branch out into the business of superabsorbent polymer—demand for which is expanding rapidly mainly for use in

paper diapers — and will construct the superabsorbent-polymer plant.

UNITIKA TO ADD POLYARYLATE RESIN

Unitika Ltd. plans to expand installed production capacity for polyarylate resin (trade name: U-Polymer) to 3,500 tons a year in 1993. The product is an all-aromatic polyester-type engineering plastic commercialized by the company itself in 1975.

The firm is now scaling up 50 per cent of the capacity of a 1,000-t/y plant at its Uji factory.

It considers that demand for the product will grow further along with expected expansion of its application to film/sheet and exterior parts of automobiles and demand growth overseas.

U-Polymer has strong resistance against heat — it is continuously usable

at temperature of up to 160°C —, shock and weather resistant and is endowed with noninflammability. The product is being increasingly applied to automotive lamp-related parts, camera parts and the mouthpieces of PET bottles.

It is reported that Hoechst Celanese (U.S.) is moving toward branching out into polyarylate-resin business. Unitika is aggressively exploiting markets for U-Polymer in the United States and Europe in a team-up with Amoco Chemical (U.S.). It has received brisk inquiries from overseas for export of the engineering plastic.

CAPACITY BUILD-UP FOR EPOXY RESIN SLATED FOR S. KOREA

Kuk Do Chemical Industry Co. —South Korean subsidiary of Toho Kasei Co. — is soon to build a 5,000-t/y plant for bisphenol A-type epoxy resin with completion scheduled for next

June. The company's combined production capacity for epoxy resin will thereby amount to 25,000 tons a year.

The South Korean firm commands more than 70% of the country's market for the product. It produces synthetic resins (polyamide/DAP resins) and inorganic chemicals (caustic soda and sodium chlorite) as well.

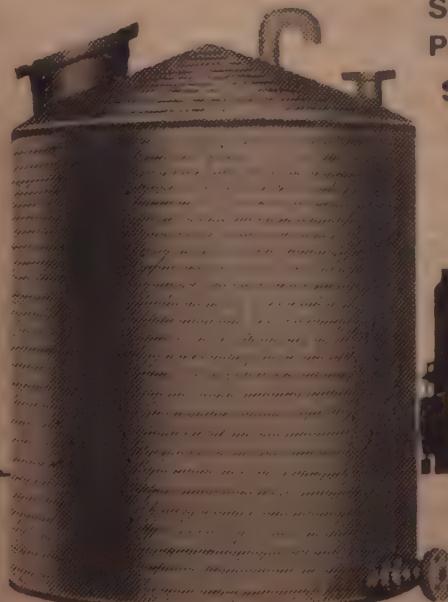
Demand for epoxy resin is steadily growing in the country. The company envisages building up the business operations concerned, taking into account that competitors are striving to scale up production and there are several late-comers launching into the business arena. It recently raised its own capital from 9 to 13.5 billion won and now aims to have its stock listed on the first section of South Korea's stock market. Among Toho Chemical's business footholds abroad, Kuk Do Chemical Industry is the oldest and it is playing a key role in the Japanese firm's operations.

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New Developments from Japan

CU-Z CATALYST SAID CAPABLE OF REDUCING NO WITHOUT AMMONIA

A research group — led by Professor M. Iwamoto — at Hokkaido University has developed a new catalytic process capable of selectively reducing nitrogen oxide (NO) in the presence of oxygen using hydrocarbons as a reducing agent and an inhouse-developed Cu-Z catalyst (Cu-ZSM-5 zeolite). It has hitherto been believed that NO can be reduced in an oxidizing atmosphere only when ammonia is employed.

The process will be used for purification of exhaust emitted from diesel engines and lean-burn gasoline engines since it is capable of constantly reducing NO contained in exhaust gas containing SO_2 as well.

Oxygen and hydrocarbons are indispensable to the new process: only a small amount of hydrocarbons are added or those remaining in the exhaust are taken advantage of. NO is converted to N_2 at the ratio of 80% in the temperature range of 300 to 400°C when the concentration of C_3H_6 (reducing gas) and NO is set at 1,000 ppm in each case. The catalytic process attains the highest activity when the O_2 concentration stands at 0.8-2.0 per cent.

The process hardly works on diesel-engine exhaust containing SO_2 as well as NO when the temperature is 300°C but the activity concerned rapidly rises at above 400°C and the conversion ratio reaches the highest level of 86 per cent at a temperature of 500°C.

An ammonia-applied denitrification process has been widely used for removing NO from flue gas discharged from manufacturing plants. It is, however, impossible to employ harmful ammonia for auto-exhaust treatment and car manufacturers have hitherto endeavored to improve an incineration system

for car engines in a bid to reduce NO_x emission.

PS/PE-COPOLYMER-BEAD FOAM ADOPTED AS ENERGY ABSORPTION MATERIAL FOR BUMPER

Sekisui Plastics Co.'s polystyrene (PS)/polyethylene (PE)/copolymer-bead foam has been adopted as energy-absorption material for use in automobile bumpers.

The energy-absorption material of a car bumper is an important component which softens the shock caused by car crashes. There is a tendency for the manufacturers concerned to shift from urethane resin to polypropylene (PP) resin for the material they employ because the latter is cheaper.

The company's PS/PE-copolymer-bead foam combines the stiffness of PS with the toughness of PE. From now on it is to put emphasis on market cultivation for the product as a material replacing PP.

SILICON-CARBIDE FIBER APPLIED TO THERMAL-TYPE INFRARED SENSOR

Nippon Carbon Co. has pioneered a thermal-type infrared sensor — in which silicon-carbide fiber is employed as thermistor material — in a team-up with Research Center for Advanced Science and Technology, University of Tokyo and Sogo Keibi Hosho Co., a major Japanese security company.

The device was manufactured by Nippon Carbon and has hitherto been assessed by the two partners. The company has now commissioned domestic sensor manufacturers to check the device with regard to its durability, stability and reliability.

It has achieved a technical breakthrough by making the most of the semiconducting properties of the said silicon-carbide fiber, whose resistivity stands at 10^3 cm. The firm paid attention to the facts that the fiber's electrical resistance changes in proportion to infrared rays' heat and it has such low heat capacity that its temperature quickly rises and electrical resistance changes even when only a small amount of infrared rays were applied thereupon.

Thermopile-applied sensors now in use have poor sensitivity and a long response time. Nippon Carbon has succeeded in reducing the time constant of an infrared sensor from nine milliseconds to one millisecond, increasing output by five times and lowering noise to one-fifth compared with those of conventional products.

To date silicon-carbide fiber has been employed as reinforcement for parts of automobile engines and airplanes and material for space development. The new-type sensor is the first case of application to exploit the fiber's semiconductor properties. Nippon Carbon envisages applying the sensor to OA equipment, industrial-use robots and high-performance cars as well as the security field.

KYOCERA, TECHNOLOGY INSTITUTE BUILD SOLAR RACING CAR

Kyocera Corp., the world's largest maker of IC ceramic packages, said it has teamed up with the Kitami Institute of Technology to build a solar-powered racing car. The blue eagle will make its debut at Australia's World Solar Challenge 1990 in November, Kyocera officials said. Kitami was responsible for the theoretical analysis needed for the vehicle's creation, while Kyocera took charge of its design and production and the development of the solar battery on which it will run.

The chassis, which weighs 150 kilograms, is 5.9 meters long and two meter wide, the officials said.

Solar collectors on the frame will convert solar energy into electricity. The maximum speed of the car is 100 kilometers per hour (KPH). Since its cruising speed is 75 KPH, above the previous winner's 66.92 KPH, the car's producers expect it to finish in sixth place or better.

The winner of the previous race, in 1987, was a car built by General Motors Corp. of the United States. A total of 45 teams will take part in the race, including 11 Japanese teams. Honda Motor Co., and GM are among the best known entrants.

MITSUBISHI KASEI TO START CLINICAL TESTS ON ANTI-PLATELET IN U.K.

Mitsubishi Kasei Corp. will put its antiplatelet-aggregation agent into clinical testing in the U.K. It will be the company's second agent to undergo clinical tests in the U.K., following a nondigitalis cardiotonic. The antiplatelet agent coded "MCI-9042" is of the new type acting to inhibit blood coagulation caused by factors other than the action of thrombin or a fibrin-producing enzyme. MCI-9042 is said to be effective particularly when used in combination with the latter-type agent.

The company has already developed "Novastan" thrombin-regulating anti-

platelet agent together with Daiichi Pharmaceutical Co. Novastan has been marketed here since spring. Mitsubishi Kasei has so far licensed its "Romet" anti-allergic agent to Bayer, its "Alnert" cerebral-function improver to Merck, its "Novastan" antiplatelet to Genetech and its "MCI-196" cholesterol reducer to Bristol-Myers Squibb. The Japanese firm opened an office in London this April to launch clinical testing in the U.K. to prepare for drug business operations in the EC. It also plans to carry out clinical testing in the U.S.

TOP POLYESTER MAKER STRIVING TO DEVELOP PROSTAGLANDIN DRUGS

Teijin is pushing ahead with commercial development of prostaglandin (PG) derivatives as therapeutic products. The company has already put two of them into clinical testing. Teijin has been tackling four PG derivative drugs: "TTC-909" prostacyclin-derivative preparation for treatment of cerebral embolism; "TEFC-612" PGE₁-derivative preparation for improving peripheral circulation; an oral preparation of TTC-909; and "TEI-1338" LTA₄-derivative acting against lipoxygenase, of which the first two are under clinical testing (phase-II and I stages) in co-operation with Taisho Pharmaceutical Co. The latter two are in the stage of preclinical testing.

The No. 1 polyester maker in Japan hopes it will be able to apply for manufacturing approval for TTC-909 as its first ethical drug within 1992 at earliest. The company has been successful in efficiently synthesizing prostaglandin and has developed a lot of its derivative specifically for cardiovascular agents. Few companies in the world have succeeded in synthesizing prostaglandin. They are Ono Pharmaceutical Co., Toray Industries (both Japan), Upjohn (U.S.) and Searle (U.S.), plus Teijin, but Upjohn has given up its commercial development.

FINE-CERAMICS BUSINESS HOTS UP IN JAN.-JUNE

According to MITI statistics, Japanese production of fine ceramics in the first half (January-June) of 1990 amounted to ¥ 406,498 million, up 3.5% over the corresponding term of the preceding year. Production of functional ceramics began to move up, though it suffered minus growth in 1989 due to decreased production of IC-packaging material and capacitors. Combined production of fine ceramics in the said term stood at 127.6 if the result of the first half of 1989 is taken as 100: it is equivalent to the July-December, 1988 level. Output of structural-use ceramics maintained the upward trend attained in the past two years, reaching the ¥100-million level for the first time.

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MARKET INFORMATION

Little Trading in Markets

Very little trading took place in the Bombay chemicals market on account of Diwali and New Year. Due to the uncertainties in the political climate markets remained

closed on Tuesday and Wednesday. Price changes announced by manufacturers are expected to make their presence felt in the coming days.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent -- and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on October 23, 1990)

INDUSTRIAL CHEMICALS	Per Kg.				
Borax (Granular)		16.00	Cobalt oxide		550.00
Borax (Powder)		22.00	Cresylic acid		62.00
Boric acid (Tech.)		32.00	Camphor (Indian)		104.00
Bisphenol-A		75.00	Cream of Tartar (Tech.) China		70.00
Butyl carbitol		106.00	Citric acid (Belgium) (Resale)		47.00
Caustic soda (Flakes)		11.00	Citric acid (Indian) (Resale)		41.00
Caustic soda (Solid)		12.00	Copper sulphate		24.00
Caustic soda (Lye)		10.00	Chromic acid		66.00
Calcium chloride 70% (Solid)		3.25	Ethylene urea		58.00
Calcium chloride 75-80% (fused)		3.50	Ferric chloride (Lumps)		9.00
Calcium chloride 36%			Ferric chloride (Anhydrous)		20.00
(Anhydrous)		5.00	Glue flakes		15.00
Calcium carbonate (precipitated)		6.00	Glue sheets		6.75
Calcium carbonate (Activated)		5.75	Gohsenol GH-17		135.00
			Hydro		45.00



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Litharge	40.00	Sodium nitrite (Resale) per 50 kg.	Benzoyl chloride	22.00
Lead Acetate (Tech.)	39.00	1,300.00	Bromine Liquid	68.00
Lithopone	32.00	Sodium chlorite 80% (Spain)	Chloroform	30.00
Magnesium chloride (Crystal)	2.00	Soda Ash (Tata)	Carbon Tetrachloride	20.00
Menthol crystal (Flakes)	360+Ex+ST	Soda Ash (Birla)	Cellosolve	65.00
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Menthol crystal cold	395+Ex+ST	Sodium bicarbonate	Cyclohexanol	58+ST
Magnesium carbonate (Japan)	30.00	Sodium bisulphite	Diacetone (Resale)	26.75
Magnesium carbonate (Indian)	26.00	Sodium silicate	Diethyl Oxalate	34.00
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RASHMI DHABUWALA
(Authorised Signatory)

R.V. CORPORATION

9, Uttam Chambers, 39, Syed Mukri Street, Katha Bazar, Bombay 400 009.

Phones: 325440/341184

Resi: 6366147

Gram: AMARJYOT, Bombay 400 009.

For Your Requirements Of:

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Contact Manufacturers

MULTI ORGANICS PRIVATE LIMITED

K-208, Keshava Bldg., 2nd Floor, Bandra-Kurla Commercial Complex,
Behind Drive-in-Theatre, Bandra (E), Bombay-400 051.

Phone Nos.: 6407778/6424736 Gram: MULTIORG, Bombay-51
Telex: 011-74530 MOL IN

Factory: A-1, MIDC Industrial Area, Chandrapur-442 401 (M.S.).
Phone: 7-54 Telex: 716-213 MORG-IN

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Hiren Chem Corporation

306, Adamji Building, 3rd Floor, 413-Narshi Natha Street, Bombay 400 009.

Tel: 343426-333692-338139. (R) 5604922.

Branch Office: SHINE PHARMA CHEM

D/102 P.C. Tower, 4th Floor, Opp. Delhi Darwaza, Shahi Baug Road, Ahmedabad 380 004. Tel: 20959-24186. (R) 67003-68229

Bombay Drugs Market

(Prices as on October 23, 1990)

Product	Rs./kg.	Product	Rs./kg.	Product	Rs./kg.
Acriflavine DPC	850.00	Diphenhydramine HCL	310.00	Morpholine	140.00
Aluminium Hydroxide IP	43.00	Disodium Hydrogen Citrate	43.00	Niacin	220.00
Ampicillin Trihydrate	1750.00	Ephedrine HCL	1900.00	Niacinamide	270.00
Aminophylline	335.00	Erythromycin Estolate	2250.00	Nifidipine	1750.00
Albendazole	2100.00	Erythromycin Stearate	2050	Nitrofurazone	280.00
Analgin	280.00	Ethambutol IP	900.00	Oxyphenbutazone	625.00
Aspirin IP	85.00	Ethophylline	650.00	Papaverine HCl	2000.00
Atenolol	2850.00	Ferrous Fumarate	38.00	Paracetamol	155.00
Benzoic Acid IP	34.00	Folic Acid IP	3200.00	Pectin IP	425.00
Bromine	65.00	Furosemide IP	2200.00	Pepsin 1:3000	375.00
Bromhexine HCL	2250	Furazolidone IP	400.00	Phenbarbitone	510.00
Butylated Hydroxy Toluene	650.00	Guanidine Nitrate	40.00	Pheniramine Maleate	1100.00
Caffeine Citrate IP	360.00	Gallic Acid	285.00	Phenyl Butazone USP	550.00
Caffeine IP	385.00	Haloperidone	19,000.00	Piperazine Citrate	95.00
Calcium Gluconate IP	45.00	Hematropine Methyl Bromide	12.00	Piperazine Hexahydrate	80.00
Calcium Glycerophosphate	160.00	Hydrazine Hydrate	80.00	Potato Starch	65.00
Calcium Lactate	40.00	Ibuprofen IP	370.00	Propanolol HCL	1700.00
Calcium Phenthonate	635.00	Indomethazine	825.00	Pseudoephedrine HCL	2200.00
Cetrimide IP	210.00	I.N.H.	280.00	Pyrazinamide	1325.00
Chloramphenicol Powder	1650.00	Inosite IP	900.00	Ranitidine	3100
Chlorbutol	95.00	Iodochloro	500.00	Rifampicin IP	3900.00
Chlorhexidine Gluconate 20% BP	225.00	Lactose IP	38.00	Saccharine Sodium	215.00
Chloroquin Phosphate	850.00	Lactic Acid	90.00	Salbutamol Sulphate	7300.00
Chlorpromazine HCL	1500.00	Levamisole	1500.00	Sodium Iodide	425.00
Choline Chloride FG	35.00	Lignocaine HCL	290.00	Sodium Methoxide	96.00
Choline Chloride IP	65.00	Lignocaine Base	325.00	Sorbitol Powder	115.00
Cloxacillin Sodium	2150.00	L. Lysine Feed	85.00	Sorbitol USP	13.00
Cimetidine	2050.00	L. Lysine Pharma	300.00	Sulphacetamide	300.00
Citric Acid IP	38.00	Magaldrate IP	40.00	Sulphamethoxazole	305.00
C.P. Maleate	1150.00	Magnesium Hydroxide	30.00	Tinidazole	375.00
Cyproheptadine Td	9500.00	Magnesium Trisilicate IP	11.00	Theophylline Anhydrous	390.00
Dexamethasone	95.00	Mannitol USP	102.00	Thiacetazone	275.00
Diazepam	800.00	Mebendazole	560.00	Tolbutamide	200.00
Dicyclomine Hcl	1500.00	Mercurochrome NF	280.00	Trimethoprim IP	980.00
Diethyl Carbamazine Citrate	300.00	Methyl Chloroformate	80.00	Vitamin A Palmitate	2600.00
Di-iodohydroxyquinoline	570.00	Metochlopromide TCL	1800.00	Vitamin B6 Hydrochloride	1400.00
Diloxanide Fumarate Ip	500.00	Metronidazole IP	415.00	Vitamin B2 5-Phosphate	4100.00

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COBALT SULPHATE
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NICKEL CARBONATE
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NICKEL SULPHAMATE SOLUTION
ZINC SULPHATE (PURE)
ZINC SULPHATE MONO HYDRATE
(PURE)
ZINC CARBONATE
ZINC ACETATE
MANGANESE ACETATE

Contact Manufacturers:

M/s. EASTMEN CHEMICALS**Residence:**310/3, Jawahar Nagar, Road No. 16,
Goregaon (West), Bombay 400 063

Tel: 6724940

Office:9-B, Popat Apartment, Oshiwara
Garden Road, Amrut Nagar, Jogeshwari
(West), Bombay 400 102. Tel: 6284541.**Factory:**Bafna Compound, Vcoor,
Palghar, Dist. Thane.
Tel: 298

Bombay Dyes Market

(Prices as on October 23, 1990)

ACID COLOURS	Per Kg.					Per Kg.
Acid Violet 4GS	190.00	Brill. Fast Helio 2R	385.83	Red 2B		422.40
Acid Maroon V	110.00	Brill. Fast Helio 2RS	177.30	Red FB		425.80
Acid Orange II	112.55	Brill. Fast Helio BS	116.10	Red Violet FBL		622.00
Acid Orange IY	93.85	Brill. Violet Extra	181.45	Orange 3R		254.20
Acid Red A	137.00	Blue 2B	102.50	Violet 3R		370.50
Acid Scarlet 3R	128.35	Blue G	220.45	Violet RL		355.70
Acid Red 3N	195.00	Sky Blue FB	242.00	Violet 6R		638.20
Acid Red R2R	132.00	Copper Blue GR	190.25	Scarlet RR		283.50
Acid Red RS	88.00	Fast Greenish Blue GL	114.60	Rubine 3B		289.10
Acid Patent Blue AS	280.00	Developed Black BT	149.95	Rubine CB		449.50
Acid Green V	375.00	Blue NB-2B	348.45	Blue GL		419.00
Acid Coomasi Blue	200.00	Blue NB-2BG	214.70	Blue BGF		805.80
Acid Yellow 5GN	65.00	Developed Black NB-GHB	214.70	Navy Blue RE		359.90
Acid Red PG	85.00	Green B	142.75	Brown 3REL		272.80
Acid Red GRS	78.00	Green NB-B	218.90	Black GEL		420.10
Acid Black 10 BX	157.15	Green 2B-N	218.90	Dark Brown 3B		411.10
Acid Black BX	126.95	Brown MR	197.40			
Acid Black Wax	135.50	Brown CN	137.00			
Crosein Scarlet MOO	200.30	Golden Brown G	175.85			
Procinal Yellow GS (ICI, UK)	265.00	Catechin G	155.70	BASE COLOURS	Per Kg.	
Procinal Red GS (ICI, UK)	530.00	Omega Tan	161.45	Fast Yellow GC		77.75
Procinal Blue RS (ICI, UK)	315.00	Catechin GS	102.80	Fast Orange GC		128.40
Procinal Scarlet G (ICI, UK)	600.00	Black E Hly Conc.	180.15	Fast Scarlet R		198.05
Procinal Orange G (ICI, UK)	250.00	Black E Extra Hly. Conc.	180.15	Fast Scarlet RC		128.40
Procinal Rubine (ICI, UK)	550.00	Black NB-ER Hly. Conc.	290.50	Fast Scarlet RCR		105.60
To get resale price add 6% tax.				Fast Scarlet G		115.75
DIRECT COLOURS	Per Kg.	DISPERSOL COLOURS	Per Kg.	Fast Scarlet GN		92.95
Yellow 3GX	114.00	Red B 3B Conc	611.50	Fast Scarlet GG		77.75
Gun Yellow RCH	175.85	Red B 2B Conc	797.90	Fast Scarlet GGS		73.95
Fast Yellow GCH	171.50	Red CB Powder	1048.25	Fast Red B		233.50
Yellow CFG Hly Conc.	721.00	Red D2B Powder	580.65	Fast Red RC		115.75
Fast Yellow GS	126.96	Violet C 4R	1202.70	Fast Red R Flakes		158.80
Fast Yellow CHRS	116.85	Blue BG Powder	580.65	Fast Red TR		181.60
Viscose Orange A	210.35	Blue BN Powder	128.25	Fast Red TR Oil		223.35
Fast Orange GR	171.50	Blue D 2R Powder	588.25	Fast Red RL		251.20
Red	122.65	Navy BT Conc	531.95	Fast Red KB Oil		251.20
Dark Tan	98.15	Blue B 2G Conc	57.95	Fast Bordeaux GP		236.00
Red IIR	98.15	Blue BT Conc	319.50	Fast Garnet GBC		103.05
Red 4B	217.55	Blue BR	482.40	Fast Violet B		548.80
Bordeaux BW	170.10	Yellow 7GL	813.20	Fast Blue BB		566.50
Fast Scarlet 4BS	223.50	Yellow 5RX	269.90	NAPHTHOL COLOURS	Per Kg.	
Red 12B	220.45	Yellow 3G	473.20	ASG		301.85
Bordeaux Hly. Conc.	249.20	Yellow	140.00	AS		205.65
Cotton Red N	117.05	Yellow AL	167.20	ASSW		379.10
Brill. Fast Helio B	362.85	Yellow Brown REL	311.70	ASRS		253.75
		Yellow FFL	571.40	ASBO		266.40
		Gold Yellow GG	320.80	ASD		209.45
		Pink REL	593.00	ASOL		243.60
		Red BEL	615.60			

ASTR	369.00	Blue H-FRD	305.80	Brill. Purple 2R Hly. Conc.	744.25
ASPH	336.05	Navy Blue H ER	333.75	Brill. Purple 4R Supra Disp.	604.25
ASE	236.00	Blue H 5RX	286.20	Brill. Purple 2R Acra Conc.	779.85
ASEL	249.95	Navy Blue M 3R	355.70	Blue 2R Pdr. Fine	675.30
ASLB	2,002.35	Brill. Blue MR	405.60	Blue BC Acra Conc. Pdr. Fine	1013.15
ASBT	2,459.45	Brill. Blue M RX	214.20	Blue BC Conc. Pdr. Fine	713.65
ASWG	143.00	Brill. Blue M-G	226.45	Blue R Conc. Pdr. Fine	719.70
ASSG	538.65	Blue M 4GD	369.40	Blue Conc. Powder	645.80
ASSR	652.60	Navy Blue M RB	341.85	Brill. Blue 2R Hly. Conc.	378.55
		Turquoise M-G	240.30	Blue RR Supra Powder	629.35
		Brill. Blue M GX	516.25	Brill. Blue 2R Supra Disp.	115.65
PROCIION COLOURS		Per Kg.		Dark Blue 2R Powder Fine	512.65
Golden Yellow HR	207.95	Blue 3R Acra Powder	718.20	Blue BC Supra Disp.	419.65
Brill. Yellow H4G	145.65	Dark Brown H 6R	248.45	Jade Green XBN Powder Fine	555.80
Supra Yellow H-8GP	168.55	Cobalt Oxide	285.00	Jade Green XBN Acra	1026.05
Brill. Yellow HE6G	214.75	Green H 4BD	287.00	Conc. Pdr.	533.25
Yellow G-E4R	276.05	Green H-E4BI	169.80	Jade Green 2G Pdr. Fine	125.40
Brill. Yellow H7G	332.30	Red Brown H IF	143.25	Jade Green 2G Ptg. Paste	126.00
Yellow M4R	275.45	Orange Brown H 28	209.05	Jade Green XBN Ptg. Paste	618.00
Yellow M GR	387.65	Brown M GRN	188.80	Jade Green 2G Supra Disp.	563.90
Brill. Yellow M4G	201.15	Black H-N	314.20	Olive D Pdr. Fine	421.70
Brill. Yellow M8G	366.10	SULPHUR COLOURS		Jade Green XBN Supra Disp. (N)	327.30
Yellow M 3R	244.70	Per Kg.		Olive OMW Pdr. Fine	698.55
Brill. Orange H 2R	303.80	Navy Blue	210.35	Olive OMW Supra Disp.	538.05
Brill. Red H 7B	157.95	Green G	194.55	Olive D Supra Disp.	361.70
Brill. Orange M 2R	313.15	Black Grains Extra	72.25	Olive R Supra Disp.	470.25
Brill. Red H 8B	213.55	Black Grains OG	73.70	Olive D Ptg. Paste	193.00
Brill. Scarlet H RN	245.05	Black GXE Conc.	70.85	Olive Green B Ptg. Paste	199.10
Supra Red H-3BP	179.80	Black GXE	57.90	Olive Green B Acra Conc.	741.10
Brill. Red H-F3B	243.45	Black GXR	69.40	Olive R Acra Conc.	779.85
Brill. Magenta HB	182.00	Black Grains 800	62.80	Brown R Pdr. Fine	869.45
Brill. Red M 5B	160.05	Black EXR Grains	73.70	Dark Brown 3R Fine	826.25
Brill. Red M 8B	218.35	Black EXR Grains 800	59.35	Brown G Supra Disp.	582.05
Brill. Pink MB	137.10			Brown 2G Supra Disp.	716.10
Brill. Magenta MB	163.65			Brown R Supra Disp.	547.35
Brill. Purple H-3R	219.55	VAT COLOURS (ICI)		Brown BR Powder	867.75
Brill. Purple H-7R	175.40			Dark Brown 3R Ptg. Paste	217.15
Navy Blue H 3R	333.75	Yellow 5G Supra Disperse	561.85	Dark Brown 3R Supra Disp.	529.60
Brill. Blue H-GR	406.40	Yellow 5G Acra Con.	818.60	Brown G Acra Conc.	967.95
Brill. Blue H 5G	207.95	Gold Orange 3G Pdr. Fine	1158.45	Brown M. Powder Fine	768.80
Blue H 5RX	286.20	Brill. Orange 6R Pdr. Fine	624.35	Grey M. Supra Disp.	585.45
Brill. Blue H 7G	213.95	Gold Orange 3G Supra Disp.	693.85	Blue BC Acra Conc. Pdr. Fine	762.70
Brill. Blue H 7RX	358.15	Brill. Orange 6RX Powder	394.30	Direct Black AC Supra Disp.	415.75
Turquoise HA	265.05	Brill. Red 3B Pdr. Fine	1214.15	Direct Black AC Pdr. Fine	574.70
Supra Blue H-3RP	595.30	Brill. Red 3B Supra Disp	867.45	Direct Black CH Supra Disp.	490.45
Supra Turquoise H 2G P	181.50	Brill. Purple 3R Acra Powder	827.05	Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: OCTOBER 20: NNS Borax granular and crystal jumped up sharply by Rs. 40/50 at Rs. 900 each per 50 kg in the Delhi chemicals market during last week, following fall in import of raw material from Turkey in view of Gulf crisis, says NNS. Boric acid technical registered a marked rise of Rs. 500 at Rs. 2,100 per 50 kg in view of negligible stock in the market. Chatkolite and sufolite spurted by Rs. 3 at Rs. 62 and Rs. 63 per kg in view of increased speculative activities. Rangolite Germany went up by Rs. 5 at Rs. 100 per kg in view of dwindling stock and good demand from consumers. Menthol medium and bold declined by Rs. 5 at Rs. 285 and Rs. 300 in the absence of fresh buying support. Menthol flake dropped by Rs. 4 at Rs. 266. DMO moved down by Rs. 10 at Rs. 70 in view of better supply and poor offtake from consumers. In view of improved supply and reduced demand from bakeries, ammonia bicarb drifted lower by Rs. 20 at Rs. 220 per 25 kg. Mercury, suffered a setback of Rs. 100 at Rs. 10,900 in the absence of demand from the industrial sectors.

Sodium nitrite reacted downward by Rs. 25 at Rs. 950/1100 in view of nervous offerings by the stockists.

As a result of acute shortage of raw material, acid slurry soft jumped up by Rs. 12 at Rs. 39 per kg in view of good demand from liquid soap manufacturers. Acid slurry hard edged up by Rs. 3 at Rs. 35 due to fall in supply and rise in demand from detergent powder manufacturers. Phenol jumped up by Rs. 6 at Rs. 48. Titanium dioxide TTP and K-brand rose from Rs. 60 and Rs. 55 to Rs. 61 and Rs. 56 per kg respectively.

Paraffin wax shot up again by Rs. 100 at Rs. 1,150 per bag following enhancement in the supply rates from Rs. 592 to Rs. 737 per bag by the Govt. Slack and match wax hardened sharply by Rs. 500/1,500 at Rs. 11,000 and Rs. 19,500 per tonne. Caustic soda flakes flared up by Rs. 25 at Rs. 560. In the absence of supply acetic acid moved up by Rs. 2.25 at Rs. 16.50 per kg. Other chemicals remained firm at their previous level.

Mentha Oil (Per Kg.)	180.00
Glycerine (Per Kg.)	53/56.00
Sodium Silicate (Per quintal)	300/400.00
Hexamine (Per Kg.)	34.00
Acetic Acid Glacial (Per Kg.)	16.50
Copper Sulphate (Per quintal)	2,400/2,600
Formic Acid (Per Kg.)	25.00
Formaldehyde (Per Kg.)	8.50
Hydrogen Peroxide (Per Kg.)	34/35.00
Calcium Carbonate (Per Tonne)	2,800/5,800
Acid Slurry Soft (Per Kg.)	39.00
Acid Slurry Hard (Per Kg.)	35.00
Phosphoric Acid (Per 50 Kg.)	1,230.00
Potassium Nitrate (Per quintal)	1,000/1,250.00
Potassium Permanganate (Per 50 Kg.)	2,600/3,000.00
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	700.00
Titanium Dioxide Anatase T.T.P. (Per Kg.)	61.00
Titanium Dioxide RC-822 (Per Kg.)	86.00
Titanium Dioxide Anatase K-Brand (Per Kg.)	56.00
Titanium Dioxide RCR-2 (Per Kg.)	90.00
Zinc Oxide (Per Kg.)	46.00/50.00
Phenol Carbolic Acid (Per Kg.)	48.00
Carbon Tetrachloride (Per Kg.)	24.75
Chloroform (Per Kg.)	28.00
Sodium Sulphate (Per metric tonne)	4,000/4,400.00
Naphthalene Balls (Per 50 Kg.)	1,500.00
Match Wax	19,500.00
Residue Wax	4,400.00

DYES & COLOURS (Per Kg.)

(DELHI MARKET RATES AS ON OCTOBER 20, 1990)

Ammonia Bicarb (Per 25 Kg.)	220.00	Tartaric acid France (Per Kg.)	314.00
Mercury (Per flask)	10,900.00	Sufolite (Per Kg.)	63.00
Soda ash (Per bag)	365.375.00	Chatkolite (Per Kg.)	62.00
Ammonium Chloride (50 Kg.)	140/160.00	DMO (per Kg.)	80.00
Caustic soda flakes (50 Kg.)	560.00	Boric acid Technical (Per 50 Kg.)	2,100.00
Citric acid (Per 50 Kg.)	2,175/2,375.00	Paraffin Wax (Per 50 Kg.)	1,150.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00	Slack wax (Per metric tonne)	11,000.00
Stable Bleaching Powder KCI (Per 25 Kg.)	90.00	Tartaric Acid (Swastik Per Kg.)	210.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	91.00	Borax Granular (Per 50 Kg.)	900.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00	Borax Crystal (Per 50 Kg.)	900.00
Sodium Bicarbonate (50 Kg.)	325/350.00	Sodium Nitrite (Per 50 Kg.)	950/1,100.00
Sodium Hydrosulphite (Per Kg.)	42.50/45.50	Sodium Nitrate (Per 50 Kg.)	520.00
Rangolite (Per Kg.)	100.00	Camphor Thal (Per Kg.)	105.00

DIRECT DYES (Per Kg.)	
Black E Conc	120/185.30
Diazo Black B T	105/154.50
Green B	90/147.55
Blue 2-B	60/107.00
Blue 2-B 225% (JNR)	125.00
Sky Blue FB	160/248.20
Basic Auramine	55/110.00
Basic Rhodamine	315/425.00
Basic Methylene Blue	100/180.00
Basic Violet	165/210.00
Basic Malachite Green	185.00
Acid Orange	75/111.20
Congu Red H/C	85/120.95

Madras Market

The levy of 25% Gulf surcharge on petroleum products has its impact on almost all the organic solvents prices which went up by that margin. MEK was priced at Rs. 42 per kg. MIBK ruled at more or less the same price as that of MEK. Supply position of acetone continues to be tight with prices ruling at Rs. 25/kg. Toluene

price increase has resulted in the price increase of products like cre-sol, benzoic acid etc. Also prices of all dyestuff/drug intermediates costs more on account of this together with non-availability of products which in turn has affected the processing units. A complete stabilised position will be known only next week.

(MADRAS MARKET RATES AS ON OCTOBER 20, 1990)

Acetic Acid Glacial (per kg)	16.00
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	150.00
Ammonium Chloride (per MT)	2,800.00
Acid Slurry (per kg)	31.50
Barium Carbonate (per kg)	10.00
Barium Chloride (per kg)	9.00
Boric Acid Technical (per kg)	28.00
Bleaching Powder (per 50 kgs)	225.00
Borax (per 50 kgs)	800.00
Caustic Soda Flakes -- Mettur Chemicals (per MT)	11,000.00
Caustic Soda Flakes -- Andhra Sugars (per MT)	11,000.00
Calcium Chloride 70% Solid (per MT)	3,800.00
Calcium Chloride Anhydrous (per MT)	6,000.00
Calcium Carbonate (Activated) (per MT)	6,500.00
Calcium Carbonate (Precipitated) (per MT)	5,600.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	150.00
Pure Para Cresol 96% (per kg)	100.00
Meta Para Cresol 42% (per kg)	55.00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	9.50
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	50.00
Hydrosulphite of Soda (TCPL) (per kg)	42.00
Hydrosulphite of Soda (IDI) (per kg)	45.00

Hydrosulphite of Soda (BASF) (per kg)	48.00
Hexamine (per kg)	36.00
Hylosupercell (per kg)	26.00
Hydrogen Peroxide (per kg)	32.00
Litharge (per kg)	40.00
Lead Acetate (per kg)	40.00
Magnesium Carbonate (per kg)	16.00
Magnesium Chloride (per kg)	4.00
Maleic Anhydride (per kg)	44.00
Menthol Crystals (per kg)	400.00
Oxalic Acid (per kg)	16.00
Paraffin Wax (per kg)	18.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	29.00
Polyvinyl Alcohol Powder (per kg)	160.00
Pentaerythritol (per kg)	56.00
Phthalic Anhydride (per kg)	55.00
Soda Ash (TAC) (per 75 kgs)	425.00
Soda Ash (TATA) (per 75 kgs)	425.00
Sodium Bicarbonate (TATA) (per 50 kgs)	395.00
Sodium Silicate (per MT)	4,000.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	24.00
Sodium Sulphide Flakes (per kg)	20.00
Sodium Bisulphite (per kg)	8.00
Sodium Alginate (per kg)	295.00
Sodium Acetate (per kg)	8.00
Sodium Sulphate (Anhydrous) (per kg)	4.00
Titanium Dioxide (Anatase) (per kg)	65.00
Titanium Dioxide (Rutile) (per kg)	85.00
Trisodium Phosphate (per kg)	10.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	54.00

CALCUTTA MARKET (Prices as on Oct. 14, 1990)	
Acetic acid (per 50 kg)	750.00
Basic chrome sulphate (per 50 kg)	800.00
Benzene (litre)	11.50
Bleaching powder (bag)	240.00
Borax granular (per 50 kg)	810.00
Boric acid (per 50 kg)	1,625.00
Camphor (per kg)	102.00
Caustic soda lye (per ton)	NA
Caustic soda flakes (per 50 kg)	560.00
Glycerine (per kg)	53.50
Menthol bold (per kg)	570.00
Menthol medium (per kg)	380.00
Menthol small (per kg)	300.00
Phosphoric acid (per 50 kg)	850.00
Phenol (per 50 kg)	1,550.00
Soda ash (75 kg)	295.00
Sodium bichromate (per 50 kg)	1,150.00
Sodium bicarbonate (per 50 kg)	285.00
Sodium nitrate (per 50 kg)	380.00
Sodium sulphate anhydrous (per 50 kg)	320.00
Sulphuric acid (per ton)	1,600.00
Trisodium phosphate (per 50 kg)	390.00
Toluene (litre)	12.30
Zinc Chloride Powder (per kg)	14.00
Zinc Sulphate (per kg)	9.00

SOLVENTS

Acetone -- HOCL (per kg)	25.00
Butanol (per kg)	39.00
Butyl Acetate (per kg)	44.00
Benzene (per lit)	17.00
Cellosolve (per kg)	68.00
Carbon Tetra Chloride (per kg)	23.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	34.00
Diethylene Glycol (per kg)	38.00
Dichloroethane (per kg)	20.00
Di-octyl Phthalate (per kg)	58.00
Di-N-butyl Phthalate (per kg)	58.00
Ethyl Acetate (per kg)	25.00
Isopropyl Alcohol (per kg)	34.00
Methanol (per kg)	14.00
Methylene Chloride (per kg)	23.00
Methyl Ethyl Ketone (per kg)	42.00
Methyl Isobutyl Ketone (per kg)	44.00
Phenol (per kg)	50.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	98.00
Trichloroethylene (per kg)	26.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	18.00
Toluene (per lit)	18.00
Xylene (per lit)	30.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx. sailing dt. (5)
22/10	Superstars	Unimarine	Jeddah; P. Suez; Mersin; Istanbul.	30/10
28/10	Susak (Yug)	Oceanic/ L. Triest	P. Said; Rijeka; Trieste; Venice; Med. Ports. (Carting at Wadi Bunder No. 3) Trieste; Venice; Ravenna; Rijeka; Koper; Ancona. (Carting at M-171/173 Cotton Depot).	31/10
27/10	Lanka Asitha	Seahorse/	Felixstowe; London; Liverpool; Manchester; Avonmouth; Dublin; Glasgow; Wembley; Leicester; Immingham; Birmingham; Leeds; Antwerp; Bremen; Copenhagen; Gothenburg; Hamburg; Rotterdam; Oslo; Stockholm; Helsinki; Aarhus; Malmao; Norkopping. (Carting at M.O.D. No. 3).	31/10
2/11	Pavel Mizikevich (Rus)	Mackintosh Transocean/ I.S.S. Co.	Aqaba; Hodeidah; Aden; Jeddah. (Carting at T.P. No. 4). Tilbury; Avonmouth; Liverpool; Manchester; London; Felixstowe; Birmingham; Antwerp; (Rotterdam); Hamburg; Bremen; Copenhagen; Gothenburg; Oslo; Stockholm; Malmao; Leeds. (Crtg. at T.P. No. 3).	5/11
30/10	Oyster Bay	P&O/ Arebee	Felixstowe; Tilbury; Antwerp; Rotterdam; Hamburg; Bremerhaven & Scandinavian Ports via Hamburg. (Carting at E-Grain Depot). Assab; Djibouti; P. Sudan. (Carting at Timber Pond No. 1). P. Said; Alexandria; Piraeus; Venice; Trieste; Genoa; Koper; Naples; Fos; Barcelona; Valencia; Ravenna; Livorno; Las Palmas; Limassol; Constanza; Budapest. (Carting at M-Jetha Cotton Depot).	2/11
25/10	Dorothee	Samrat/ Hindustan/ Killick/	Felixstowe; Hamburg; Rotterdam; Also London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Leicester; Le Havre; Bremen; Amsterdam; Antwerp; Copenhagen; Leeds; Aarhus; Gothenburg; Oslo; Helsinki; Stockholm; Belfast and all destination in U.K.; Benelux; Germany; France; Switzerland and Austria; Barcelona; Marseilles; La Spezia; Livorno; (Leghorn); Genoa; and other Italian Ports and FCL only Beirut; Alexandria; Valletta; Limmassol; Larnaca; Lattakia; Mersin; Izmir. (Carting at M.O.D. No. 1 for Samrat and Hindustan). Felixstowe; Rotterdam; Hamburg; Antwerp; Le Havre; Lisbon; Leixoes; London; Liverpool; Manchester; Bristol; Avonmouth; Leeds; Glasgow; Tilbury; Birmingham; Dublin; Belfast; Bremen; Bremerhaven; Aarhus; Copenhagen; Gothenburg; Helsingborg; Oslo; Helsinki; Alexandria; Lattakia; Mersin; Malta; Limmassol; Piraeus. (Carting at E-Shed Grain Depot).	31/10
		L. Triest	Felixstowe & U.K. inland destinations; Hamburg; Rotterdam; and inland destinations in Cont; Genoa; Leghorn; La Spezia; Naples; with T.P. Las Palmas; Santacruz De Teneriffe; Malta; Limmassol; Alexandria; Tunis; Benghazi. (Carting at M-171/173 Cotton Depot).	
23/10	Paithoon	Silvership	Chittagong. (Carting at Timber Pond No. 3).	30/10
27/10	Lanka Asitha	Seahorse	Colombo. (Carting at M.O.D. No. 3).	31/10
30/10	Oyster Bay	P&O	Colombo; Chittagong. (Carting at T.P. No. 1).	2/11
23/10	Paithoon (Voy-40) (Thai)	U.L.A./	Singapore; Penang; P. Kelang; Keelung; Kaohsiung; Bangkok; Busan; Jakarta; Hongkong; Japan & Chinese Ports. (Carting at M-171/173 (Cotton Depot).	30/10
		Samrat/	Singapore (Direct); Penang; Jakarta; Surabaya; Belawan; P. Kelang; Bangkok; Manila; Hongkong; Kaohsiung; Keelung; Taichung; Busan; Yokohama; Nagoya; Kobe; Osaka; Tokyo. (Carting at Mallet Bunder).	
		Trident/	Busan; Hongkong; Keelung; Kobe; Nagoya; Yokohama; Penang; P. Kelang; Bangkok; Kaohsiung; Singapore. (Carting at T.P. No. 4).	
		E.S.P.L./	Singapore; Hongkong; Bangkok; Jakarta; Kaohsiung; Keelung; Penang; P. Kelang; Kota; Kinabulu; Kulaubelati; Bintulu; Kuching; Labuan; Vietnam. (Carting at M-172 Cotton Depot).	
		I.M.E./	Singapore; Bangkok; Hongkong; Keelung; Busan; Kobe; Yokohama; Nagoya. (Carting at Wadi Bunder No. 3).	
		P&O/	Far East & S. East Asian Ports. (Carting at Timber Pond No. 3).	

(1)	(2)	(3)	(4)	(5)
27/10	Lanka Asitha	Sarada/ Silvership Seahorse	Bangkok; Hongkong; Chinese Ports. (Carting at M-172 Cotton Depot). Far East; Haiphong; Ho Chi Minh. (Carting at T.P. No. 3). Singapore; Penang; P. Kelang; Bangkok; Hongkong; Keelung; Kobe; Yokohama & FCL only Busan; Inchnu; Osaka; Tokyo; Nagoya; Kaohsiung. (Carting at M.O.D. No. 3).	31/10
20/10	Lyudmila Stal (Rus).	Transocean	Singapore; Main Japan Ports.	31/10
23/10	Paithoon	Samrat/ Trident/ Arebee/ Transworld/ E.S.P.L./ Silvership	Brisbane; Sydney; Melbourne; Adelaide; Fremantle; Burnie. (Carting at Mallet Bunder). Brisbane; Sydney; Melbourne; Adelaide; Fremantle; Burnie; Auckland; Wellington; Lyttelton. (Carting at T.P. No. 4). Sydney; Melbourne; Adelaide; Brisbane. (Carting at M-Jetha C.D.). Sydney; Melbourne; Adelaide; Fremantle; Burnie; Brisbane. (Carting at CFS Cotton Avenue). Sydney; Melbourne; Adelaide; Fremantle. (Carting at M-172 C.D.). Australia & New Zealand Ports. (Carting at T.P. No. 3).	30/10
27/10	Lanka Asitha	Seahorse	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Carting at M.O.D. No. 3).	31/10
21/10	Gulf Spirit (V-03W)	Jades Ship	Dubai; Sharjah.	30/10
25/10	Rossana (Ind)	Mackintosh	Muscat; Dubai. (Carting at C-PD).	1/11
31/10	Mowlavi (Iraq)	J.M. Baxi	Bandar Abbas.	3/11
23/10	Paithoon	Seahorse	Port Louis. (Carting at M.O.D. No. 3).	30/10
30/10	Oyster Bay (V-4054)	Arebee/ P&O	Dar Es Salaam & Mombasa (Direct); Kampala; Jinja; Tororo; Lugazi; Entebbe (Uganda); Kigali (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Cartg. at M.J.C.D.). Mombasa; Dar Es Salaam (Direct); Beira; Mahe and Inland destinations in East Africa. (Carting at Timber Pond No. 1). Mogadiscio; Mombasa; Dar Es Salaam. (Carting at E-Shed Grain Depot).	2/11
25/10	Kapitan Medvetskiy	Sai Ship		30/10
30/10	S/o. Gujarat (Ind)	S.C.I.	Seychelles; P. Louis (Direct); Tamatave.	15/11
25/10	Dorothee	Samrat/ Hindustan/ L. Triest	Boston; New York; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonville; P. Everglades; Philadelphia; Halifax; Montreal; Toronto & S. American Ports. (Carting at M.O.D. No. 1 for Samrat & Hindustan) (Carting at M-171/173 Cotton Depot for L. Triest).	31/10
23/10	Paithoon	Samrat/ U.L.A./ E.S.P.L./	Longbeach; Oakland; Seattle; Los Angeles; San Francisco; Philadelphia Savannah; Charleston; Baltimore; Norfolk; New York; Boston; St. John; Vancouver; Montreal; Toronto; New Orleans; Houston. (Carting at M.B.). Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Charleston; Houston; Norfolk; Baltimore; New York; Halifax; Montreal; Toronto; West Indies Ports. (Carting at M-171/173 Cotton Depot).	30/10
		Trident/ Arebee	Longbeach; Charleston; New York; St. John; Norfolk; Oakland; Vancouver (B.C.); Seattle; Montreal; Baltimore; Boston; Chicago; Dallas; Houston; Longview; Los Angeles; New Orleans; Philadelphia; Portland; San Diego; Mexico City; Siouxfall; San Francisco; Sacramento; Stockton; Halifax; Toronto; Savannah; Tacoma; Miami; & all other destinations. Also Caribbean Ports. (Carting at M-172 Cotton Depot).	
2/11	Pavel Mizikevich	Marathon	S. American; Caribbean and Central American Ports. (Carting at T.P. No. 4).	
27/10	Lanka Asitha	Seahorse	S. American Ports. (Carting at M-Jetha Cotton Depot).	5/11
5/11	Vishva Parimal (Ind)	S.C.I.	Boston; New York; Baltimore; Norfolk. (Carting at T.P. No. 3). New York; Baltimore; Charleston; Norfolk. (Carting at M.O.D. No. 3). New York; Baltimore; Savannah; Norfolk; Charleston; Houston; Jacksonville; New Orleans; Boston; P. Everglades. (Carting at B. Pier Extn & CFS Shed No. 4 Kalamboli).	31/10
28/10	Susak (V-9/90)	Oceanic	New York; Baltimore; Philadelphia; Chicago; Boston; Norfolk; Atlanta; Charleston; Savannah; Miami; Houston; & other inland destinations in U.S. East Coast & S. American Ports. (Cartg. at Wadi Bunder No. 3).	31/10
23/10	Paithoon	U.L.A./ Trident	Lagos/Apapa; Abidjan; Lome/Matadi. (Carting at M-171/173 C.D.). Tema/Lome; Lagos; Matadi; Lobito; Luanda; Freetown; Cotonou;	30/10

(1)	(2)	(3)	(4)	(5)
25/10	Dorothee	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Douala, Cotonou; Nouakchott; Libreville; Matadi; Conakry; Freetown. (Carting at M-171/173 C.D.).	31/10
30/10	Oyster Bay (Voy 4054)	Arebee	Lagos/Apapa; P. Harcourt; Abidjan; Tema; Takoradi; Monrovia, Lome; Freetown; Cotonou; Douala; Matadi. (Carting at M-Jetha Cotton Depot).	2/11

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
30/10	Jilfar	Transworld	S. America
30/10	Oyster Bay	P&O	E. Africa
2/11	Pavel Mizikovich	Transocean	U.K. Cont.
30/10	S/o. Gujarat	S.C.I.	U.K. Cont.
5/11	Vishva Parimal	S.C.I.	U.K. Cont/U.S.

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Materials Imported

MATERIALS IMPORTED BOMBAY (From 22.5.90 to 23.5.90) (continued from previous issue)

ALUMINIUM OXIDE: From FRG: Insulators & Electricals Co., 10 Mts., Rs. 1,42,325; From France: Grindwell Norton Ltd., 4,000 Kgs., Rs. 78,287.

AMOXYCILLIN D PARA HYDROXY PHENYL GLYCINE METHYL POTASSIUM DANE SALT: From Singapore: Ranbaxy Laboratories Limited, 3,000 Kgs., Rs. 1,125,616.

ORTHO BENZALDEHYDE SULPHONIC ACID: From Japan: Roha Dye Chem P. Ltd., 1,000 Kgs., Rs. 2,39,358.

5 TERT. BUTYL METAXYLENE: From FRG: D.D. Shah & Co., 13,040 Kgs., Rs. 6,63,703.

BUTYL GLYCOL: From FRG: Dai Ichi Karkaria P. Ltd., 750 Kgs., Rs. 24,150.

BUTYNE DIOL REACTED: From UK: Canning Mitra Phoenix Ltd., 1,850 Ltr., Rs. 2,03,272.

C ACID 97%: From Korea: IDI Ltd., 2,000 Kgs., Rs. 1,29,489; 4,000 Kgs., Rs. 2,58,979.

CALCIUM CARBONATE: From France: B.M. Thakkar & Co. Ltd., 38,400 Kgs., Rs. 2,26,910.

CAPROLACTAM: From Netherlands: Century Enka Ltd., 126 Mts., Rs. 37,36,444; Shree Synthetics Ltd., 180 Mts., Rs. 54,97,192.

CARBON BLACK: From FRG: Bombay Paints & Allied Products, 1,200 Kgs., Rs. 35,218; Ceat Ltd., 1,000 Kgs., Rs. 28,973.

2-CHLOROETHYL ETHYLENE DIPHOSPHATE: From USA: Sheela Foam (P) Ltd., 2,002 Mts., Rs. 1,17,041.

O-CHLORO P-NITROANILINE

TECH.: From FRG: Pidilite Inds. 1,000 Kgs., Rs. 2,64,111.

N-CHLORO SUCCINIMIDE: From UK: Ranbaxy Labs. Ltd., 2,000 Kgs., Rs. 3,90,392.

CITRIC ACID MONOHYDRATE BP 80: From China: Neelraj Chemicals 60 Mts., Rs. 7,67,676.

CITRIC ACID BP 80 MONO: From Hong Kong: Nirkon Pharmls Ltd., 40 Mts., Rs. 5,44,482.

BETA CYCLODEXTRIN: From Belgium: Sandoz (India) Ltd., 300 Kgs., Rs. 1,00,755.

2,4-DICHLOROBENZYL CHLORIDE: From Japan: JAL Ltd., 1,000 Kgs., Rs. 1,84,985.

DICYANDIAMIDE: From FRG: Cibatul Ltd., 1,000 Kgs., Rs. 41,681.

DIETHYL ETHER ANHYDROUS: From UK: Jashan Textile Mills Ltd.,

300 Kgs., Rs. 11,308.

DIETHYLENE DIAMINE: From Spain: Chemipharm Chem. & Pharmls., 23 Kgs., Rs. 1,86,097; From Sweden: Technochem, 2,936 Kgs., Rs. 1,84,651.

DIMETHYL CARBONATE: From France: Kemwell P. Ltd., 10,000 Kgs., Rs. 3,54,466.

DIMETHYL SULPHOXIDE: From USA: Shaba Chemicals I. Ltd., 7,000 Lbs., Rs. 97,728.

FERRIC OXIDE: From Taiwan: Cosmo Ferrites Ltd., 1,000 Kgs., Rs. 13,508.

FORMAMIDE: From FRG: Geoffrey Manners & Co. Ltd., 18,400 Kgs., Rs. 4,86,345.

FURFURYL ALCOHOL: From Belgium: IVP Ltd., 6,000 Kgs., Rs. 1,88,575.

GUM ROSIN: From Hong Kong: Sigma Paints Ltd., 17.55 Mts., Rs. 1,57,730; From Indonesia: Arco Pro-



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ducts, 2.88 Mts., Rs. 24,756; Bluebell Polymers P. Ltd., 36 Mts., Rs. 3,14,125; Shree Acids & Chemicals Ltd., 18 Mts., Rs. 1,61,371.

INDOMETHACIN: From Hong Kong: Parksan Chemicals P. Ltd., 400 Kgs., Rs. 1,74,514.

IODINE CRUDE: From Japan: Hindustan Basic Drugs, 1,000 Kgs., Rs. 2,96,674.

ISOPHORONE: From Japan: Saphire Prtg. Inks P. Ltd., 3,040 Kgs., Rs. 67,552.

LILIAL: From Switzerland: Seth Bros. Perfumers P. Ltd., 500 Kgs., Rs. 98,103.

LINALOOL: From Japan: Anant Agarbatti Works, 1,360 Kgs., Rs. 1,74,932.

LITHIUM CARBONATE: From USA: Sun Pharmal. Inds., 2,310 Lbs., Rs. 76,594.

MALEIC ANHYDRIDE: From

FRG: Selectochem, 17,500 Kgs., Rs. 3,20,670.

MERCURY: From Spain: Standard Alkali, 3,450 Kgs., Rs. 4,60,732.

MERCURY METAL 99.99 MIN.: From Japan: Ganeshdas & Sons, 50 Mts., Rs. 2,09,416.

METHACRYLAMIDE: From USA: Indofil Chemicals Co., 825 Lbs., Rs. 51,148.

2-METHOXY ETHOXYSILANE: From USA: Cable Corp. of India Ltd., 200 Kgs., Rs. 35,765.

METHYL CHLORO ACETATE: From Japan: Cibatul Ltd., 11,000 Kgs., Rs. 5,18,307.

P-METHYL MERCAPTO M-CRESOL: From FRG: Bayer (India) Ltd., 15,773 Kgs., Rs. 3,04,666.

METHYL PHENYL ETHANOL-AMINE: From USA: Unique Resins Inds., 215.46 Kgs., Rs. 32,793.

NEOPENTYL GLYCOL: From FRG: Marpol Chemicals P. Ltd., 2,500 Kgs., Rs. 62,534.

NITRO AMINO PARA CRESOL: From Japan: I.D.I. Ltd., 520 Kgs., Rs. 2,78,013.

OCTOIC ACID: From FRG: Nar-chem Inds., 14,430 Kgs., Rs. 2,72,122.

D(-)ALPHA PHENYL GLYCINE CHLORIDE HCl: From Netherlands: Kopran Chemical Co. Ltd., 2,030 Kgs., Rs. 8,61,548.

GAMMA PICOLINE: From Japan: Pfizer Ltd., 10,070 Kgs., Rs. 5,27,207.

PIVALOYL CHLORIDE: From France: Abdullabhai Abdulkader, 2,160 Kgs., Rs. 1,69,419.

POLYVINYL ALCOHOL: From Japan: Gujarat Supertex P. Ltd., 1.5 Mts., Rs. 60,207; Pidilite Inds. Ltd., 17 Mts., Rs. 585,362; Taloja Resins & Adhesives Ltd., 17 Mts., Rs. 5,85,394.

POLYVINYL CHLORIDE: From Brazil: The Bharat Vijay Mills Ltd., 100 Mts., Rs. 12,11,200.

POLYETHYLENE WAX: From Japan: Coates of India Ltd., 1,000 Kgs., Rs. 33,555.

POTASSIUM CHLORIDE: From Canada: Atul Products Ltd., 240 Mts., Rs. 8,64,156.

PROPIONIC ANHYDRIDE: From Japan: Jagsonpal Pharms. Ltd., 3.24 Mts., Rs. 1,29,374.

PROPYLENE GLYCOL USP: From USA: Indian Gum Inds. Ltd., 1,00,620 Kgs., Rs. 16,59,384.

N-PROPYLETHANOLAMINE: From USA: BASF India Ltd., 20,500 Lbs., Rs. 7,87,058.

SODIUM LAURYL SULPHATE: From FRG: V. Pravin & Co., 11,000 Kgs., Rs. 3,74,620.

STANNIC OXIDE: From USA: Elpro Intl. Ltd., 200 Lbs., Rs. 33,013.

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TARTARIC ACID BP/USP: From Argentina: Medchl Chemicals & Pharmls. Ltd., 18 Mts., Rs. 10,54,701.

L-TARTARIC ACID BP/IP: From Spain: Pfizer Ltd., 3 Mts., Rs. 2,34,547.

THIOUREA: From Japan: Henkel Chemicals India Ltd., 2,000 Kgs., Rs. 67,110; JAL Ltd., 3,600 Kgs., Rs. 1,14,959.

TITANIUM DIOXIDE: From Australia: Garware Paints India, 40 Mts., Rs. 17,10,238; From China: Delux Sales Corp., 17.5 Mts., Rs. 4,15,175; From FRG: The Baroda Rayon Corp. Ltd., 5,000 Kgs., Rs. 2,44,320; Shree Synthetics Ltd., 3 Mts., Rs. 1,46,592; From USA: Mack Chem Corp., 18 Mts., Rs. 6,28,250.

TOLUENE DIISOCYANATE: From Belgium: Pallavi Foam Inds. P. Ltd., 36,000 Kgs., Rs. 13,50,738.

TRIETHYLENE GLYCOL: From USA: Oil and Natural Gas Commission, 87,060 Mts., Rs. 27,10,133.

TRIMELLITATE ESTER: From UK: Yate Intl. Impex P. Ltd., 7,800 Kgs., Rs. 4,57,846.

3,4,5-TRIMETHOXY BENZAL DEHYDE: From China: Shaba Chemicals P. Ltd., 1,000 Kgs., Rs. 3,50,836.

VITAMIN B6: From Japan: Crystal Pharma, 250 Kgs., Rs. 1,26,787.

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50 Mts., Rs. 7,79,457; Paharpur Plastics, 32 Mts., Rs. 5,22,764; From Saudi Arabia: Indore Plastics P. Ltd., 51.45 Mts., Rs. 8,12,577; Injecto Ind. P. Ltd., 17.15 Mts., Rs. 2,72,355; Multifilms Plastics P. Ltd., 17.15 Mts., Rs. 2,85,824; Nilkamal Crates & Containers, 17.15 Mts., Rs. 2,75,348; Plastotex Bombay P. Ltd., 10 Mts., Rs. 1,52,412; 10 Mts., Rs. 1,52,412; Sirigiri Plastic Inds., 51.45 Mts., Rs. 8,08,087; From USA: Diamond Polyprints, 35 Mts., Rs. 5,43,612; Eco Super Pack, 17.5 Mts., Rs. 2,74,860; Southern Marketing Associates, 34 Mts., Rs. 5,28,080; Vijay Chemicals & Plastics P. Ltd., 17 Mts., Rs. 2,84,807; From Yugoslavia: Arun Fats & Oil Cakes, 5,000 Kgs., Rs. 82,745.

LDPE: From Yugoslavia: Grover Overseas P. Ltd., 60 Mts., Rs. 8,93,214.

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POLYSTYRENE: From Korea: The Supreme Inds. Ltd., 34 Mts., Rs. 6,94,217; From Saudi Arabia: Super Cassettes Inds. Ltd., 51,000 Kgs., Rs. 10,90,878.

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STYRENE MONOMER: From USA: Unique Resins Inds., 8.8 Mts., Rs. 1,75,072.

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26,177; Flour Food Ltd., 15 Mts., Rs. 3,92,656; Haridsha Chemicals Inds. 2,000 Kgs., Rs. 52,354; Kaushal Aromatic Chemicals P. Ltd., 6,000 Kgs. Rs. 1,57,063; Radha Krishan Dye Chem P. Ltd., 2,000 Kgs., Rs. 52,355.

ADIPIC ACID: From FRG: Mehta Pharm. Inds., 1 Mt., Rs. 27,957; From USA: Indl. Foams P. Ltd., NA Rs. 2,37,775.

ALDEHYDE C-8: From Netherlands: Quest Intl. India Ltd., 65 Mts. Rs. 7,254.

ALUMINIUM DIOXIDE: From China: Grindwell Norton Ltd., 80 Mts. Rs. 7,98,402.

ALUMINIUM OXIDE: From FRG: IPCL, 9.909 Mts., Rs. 3,38,935; Paramount Inds., 4 Mts., Rs. 83,768.

ALUMINIUM OXIDE SYN.: From Japan: Grindwell Norton Ltd., 9,000 Kgs., Rs. 4,90,949.

DL-2 AMINO 1-BUTANOL: From FRG: Lyka Labs. Ltd., 15,210 Kgs. Rs. 24,10,869; Themis Chemicals Ltd. 15,210 Kgs., Rs. 24,42,006.

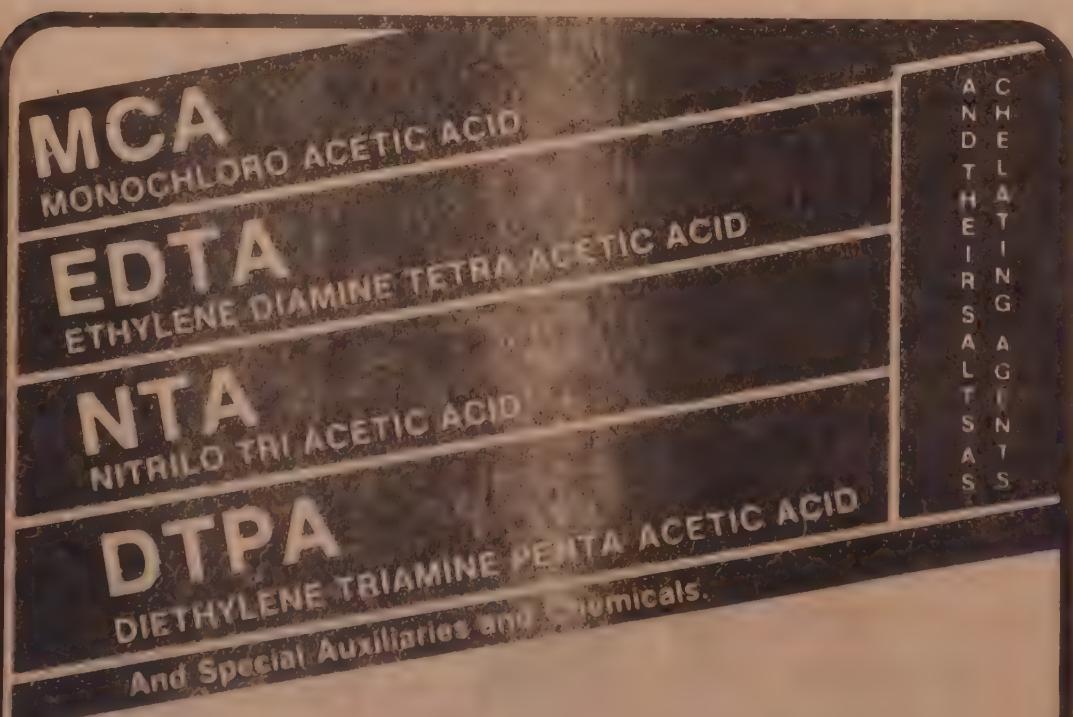
AMINOETHYL ETHANOLAMINE: From Sweden: Henkel Chemicals India Ltd., 2,000 Kgs., Rs. 80,754; From USA: Sandoz India Ltd., 14,078 Kgs., Rs. 5,52,489.

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ANILINE OIL: From Bulgaria: Kanthal Manilal & Co., 26.18 Mts. Rs. 2,48,158.

ANTIMONY TRIOXIDE: From Belgium: Orkay Silk Mills Ltd., 3,000 Kgs., Rs. 2,38,211; From France: Cable Corp. of India Ltd., 1,000 Kgs. Rs. 57,589; From UK: Cable Corp. of India Ltd., 1,000 Kgs., Rs. 60,287.

AROMATIC CHEMICALS: From France: Unique Fragrance P. Ltd., 1,000 Kgs., Rs. 1,20,669; From FRG: Harsha Aromatics, 200 Kgs., Rs. 2,05,352; From Japan: Hindustan Lever Ltd., 180 Kgs., Rs. 65,966; From Netherlands



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ARSENIC TRIOXIDE: From Belgium: Bharat Electronics Ltd., 5,250 Kgs., Rs. 80,396.

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